This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

LB
3218
M5A3

UC-NRLF
B 4 582 980

U 22290

GIFT OF
Michigan - Dept. of
Public Instruction
SIGILLVM · VNIVERSITATIS · CALIFORNIENSIS
FIAT LVX
MDCCCLXVIII
EX LIBRIS

OCT 29 1914

Manual of Schoolroom Equipment Improvement and Construction

Issued by the
Department of Public Instruction
of Michigan
1914

FRED L. KEELER
Superintendent

Manual of Schoolroom Equipment Improvement and Construction

UNIV.
CALIF.

Issued by the
Department of Public Instruction
of Michigan
1914

FRED L. KEELER
Superintendent

UNIV. OF
CALIFORNIA

LIBRARY
MSH

TABLE OF CONTENTS

	Page
Introduction	5
Part I, School equipment	9
Heating and ventilating	9
Why stoves are unsatisfactory	11
Solution of the problem	11
A home made system	11
The basement furnace	12
Correct Lighting	13
Why unilateral lighting is correct	13
What a careful test shows	13
Properly installed window shades a help	13
How to install shades	14
Expense of shades is small	14
Sanitary water supply	15
Construction of the well	15
Common drinking cup dangerous	15
An effective solution	15
Seating for health and comfort	16
Reseating usually necessary	16
Arrangement of seat and desk	16
Small sized desks essential	17
Costs of seats and desks	17
Adjustable seats and desks	18
The towel question	18
The outhouse problem	18
Indoor chemical closets	19
Outdoor toilets	20
Law governing outhouses	20
Miscellaneous equipment	20
Blackboards	20
Disinfectants	21
Dust reducers	21
Dangerous articles	21
Necessities	21
Needed equipment	21
Desirable equipment	22
Most important needs	22
Habit of reading	22
Purchase from book list	22
Young People's Reading Circle	22
Free traveling libraries	22
Free aids to teachers	22
Bulletins	25
Part II, Improvement and remodeling of school buildings	27
Making old buildings modern	29
General recommendations	29
Floor plans	29
Interior arrangement	29
Cloakrooms	29
Library or workroom	29
Fuel room	29
Correct lighting	29
Location of the windows	32
Interior decorating	32
Desirable wall colors	32
Finish of the woodwork	32
Exterior appearance	32
Part III, Construction of new buildings	33
Building a new schoolhouse	35
Location of a site	35
Dimensions	35
Lighting	35
Interior arrangement and finishing	35
The Michigan Schoolhouse	36
The best at moderate cost	36
Adaptability of the plan	36
Appearance of the building	36
Arrangement carefully considered	36
Heating, ventilating and lighting	38
Economy of construction	38
What the building will cost	38
Specifications	49
A cheaper building	60
Two-room buildings	60
Part IV, The Standard School	63
How award is made	63
Subject for discussion	63
Requirements for a Standard School	63

293972

INTRODUCTION

In presenting this manual of schoolroom equipment, improvement and construction, the Department of Public Instruction desires to arouse school officers, teachers, parents and patrons of the public schools of Michigan to the desirability of having the best possible conditions for health, comfort and efficiency in the schoolroom, and also to the possibility of securing those conditions. It may not be possible for every district in the state to approach the ideal in one year but there is no district but what can at least make some improvement which will be for the benefit of the children. While the equipment, improvement and construction plans given in this book will be of more interest to the rural district, much of the information will apply as forcibly to the town and city school, as some of the conditions prevailing in these latter districts are as detrimental to children as those existing in rural communities. As a business proposition, a well equipped attractive school is the best possible investment a district can make. It increases the value of property, makes it much easier to dispose of property, is the most conspicuous advertisement of the community's enterprise.

The health of the children is of prime importance. It seems regrettable that financial consideration should prevent boards of education from making school property safe, sanitary, comfortable and attractive when children are forced to spend from four to six hours a day in the schoolroom for eight to ten months a year during at least eight years of their lives. The present Michigan law gives school boards complete taxing power in the way of supplying equipment and furnishings. This places the responsibility of providing desirable school surroundings in the hands of the school officers and this manual is issued to assist them in using their power wisely.

The manual is divided into four sections. The first is devoted to a discussion of the selection and arrangement of suitable equipment and applies to old as well as new schoolrooms. Equipment relating to the health of the children is presented first as that is deemed much more important from every standpoint than furnishings for the academic work of the school, however important these are. The second section offers plans and suggestions for remodeling old buildings to conform with the modern scientific ideas of lighting, arrangement, etc. Plans for new one and two-room buildings together with instructions, specifications and estimates make up the third section. In order to recognize those progressive districts which, either with new or improved old buildings, make it possible for the children to spend their school life under desirable and healthful conditions, Michigan has adopted a system of standardization. The plan for this and the requirements are given in section four.

Credit is due Architect Thomas E. White of Lansing for plans and specifications for buildings, and also to the various manufacturers who furnished material and cuts for this publication.

PART I

SCHOOL EQUIPMENT

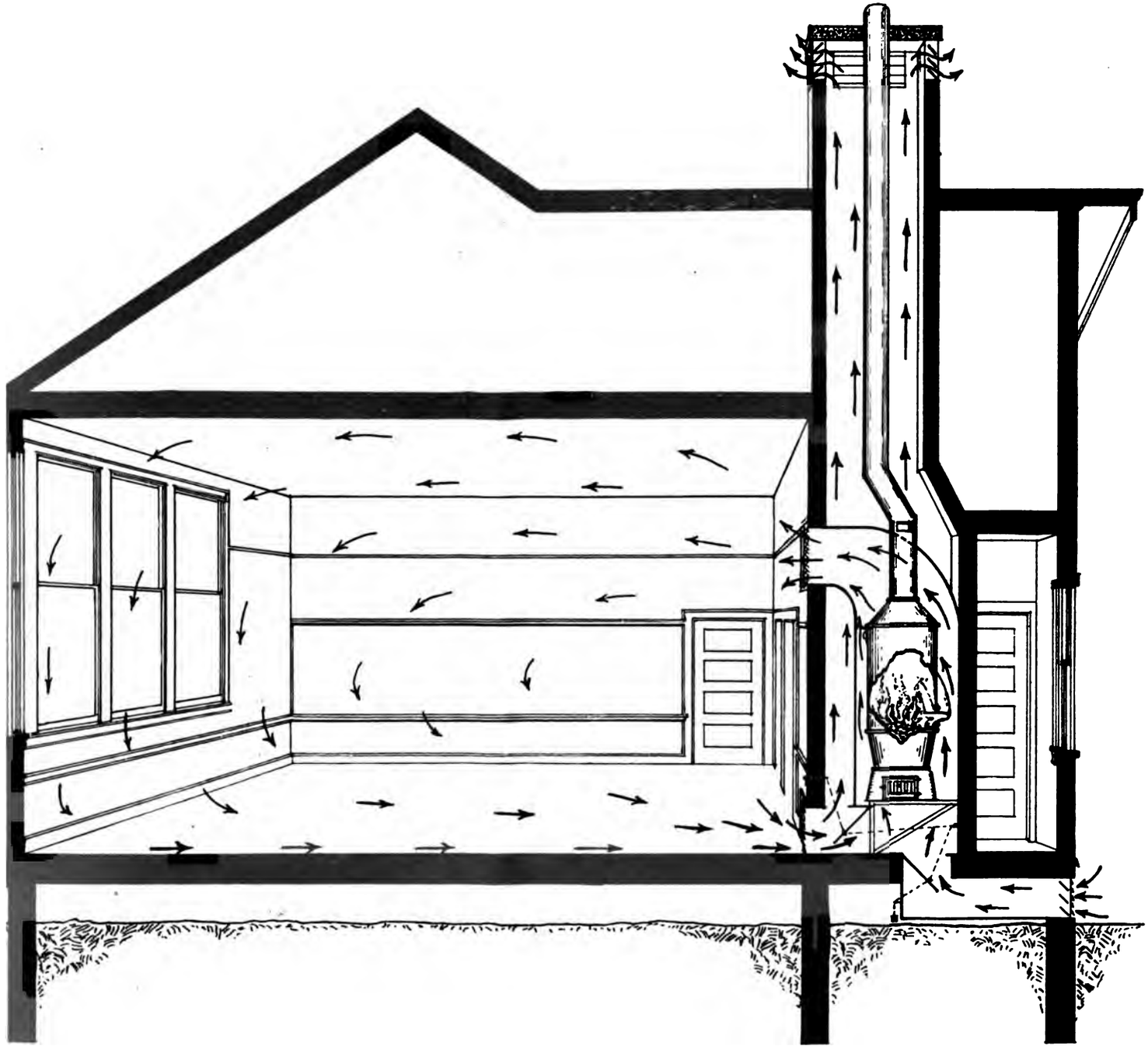
SCHOOL EQUIPMENT

With the health of the children at stake, with the efficiency of the work in the balance, it is imperative that the board of education consider carefully and provide the suitable equipment that will conserve the one and promote the other. The progressive farmer knows that money invested in proved farm machinery and in providing for the proper care of his stock and crops is an investment that pays constant and big dividends. The school is a business institution and the district which fails to provide the right kind of equipment is running this institution at a loss, and is imposing a heavy handicap on the teacher and pupils The condition should be looked into and the handicap removed at once.

In presenting the following description of equipments the Department of Public Instruction does not recommend the product of any one manufacturer, but an effort is made to show the school officers equipment that is to be had and to give reasons why its purchase and installation will better conditions that now exist.

HEATING AND VENTILATING

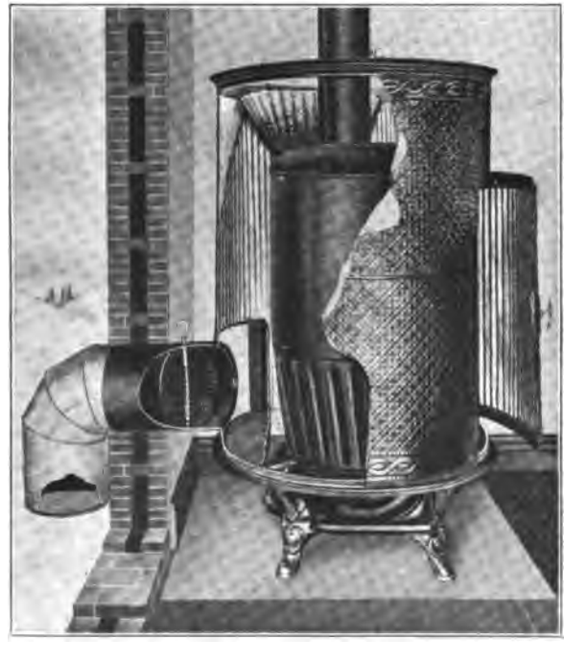
A typical stove heated schoolroom. Stove occupies the center of the room, the most valuable space. Children sitting near the stove have to shield their faces with their books because of the intense heat, while boy over in the corner is chilly. The stove is in the way, unsightly and a source of discomfort.



HEATING AND VENTILATION OF THE MICHIGAN SCHOOLHOUSE

Fresh, pure air is the most vital factor in the schoolroom and the district which does not provide a system of ventilation which brings into the room pure air from outside the building and carries off the impure air, menaces the health of the children and teacher attending the school. The fact that the percentage of teachers who die from tuberculosis is far in excess of that in the various other professions can be laid to the door of unventilated schoolrooms. The greatest safeguard an individual has against this and other diseases is the resistance power of his own system and the greatest builder of that resistance power is fresh air.

Why Stoves Are Unsatisfactory.—In a stove heated room occupied by twenty children or more, the supply of fresh air is exhausted within one-half hour and from that time on, the children breathe air which is saturated with carbon dioxide. This air also becomes filled with germs which cause colds, pneumonia, tuberculosis, etc. The stove is usually placed in the center of the room, thus being in the way of everyone. In cold weather, it is impossible to make the occupants of the room comfortable. Those sitting in the corners and sides of the room are frequently too cold while those near the stove are suffering because their bodies and faces are being scorched by the direct rays from the stove. When the room becomes overheated or the air bad, drowsiness and often headaches result, interfering with the efficiency of the pupils and the teacher. Opening the windows admits fresh air but it chills the overheated children so that coughs and colds result. As the minimum amount of fresh air supply per minute for each child should be thirty cubic feet, air spaces around doors and windows and cracks in the floor cannot be of any real service in ventilating even in a loosely constructed building. Much of the fatigue and lassitude found among school children is due to poorly ventilated schoolrooms.



Sectional view of a heating and ventilating plant showing the construction plan and method of drawing the cold air from the outside.

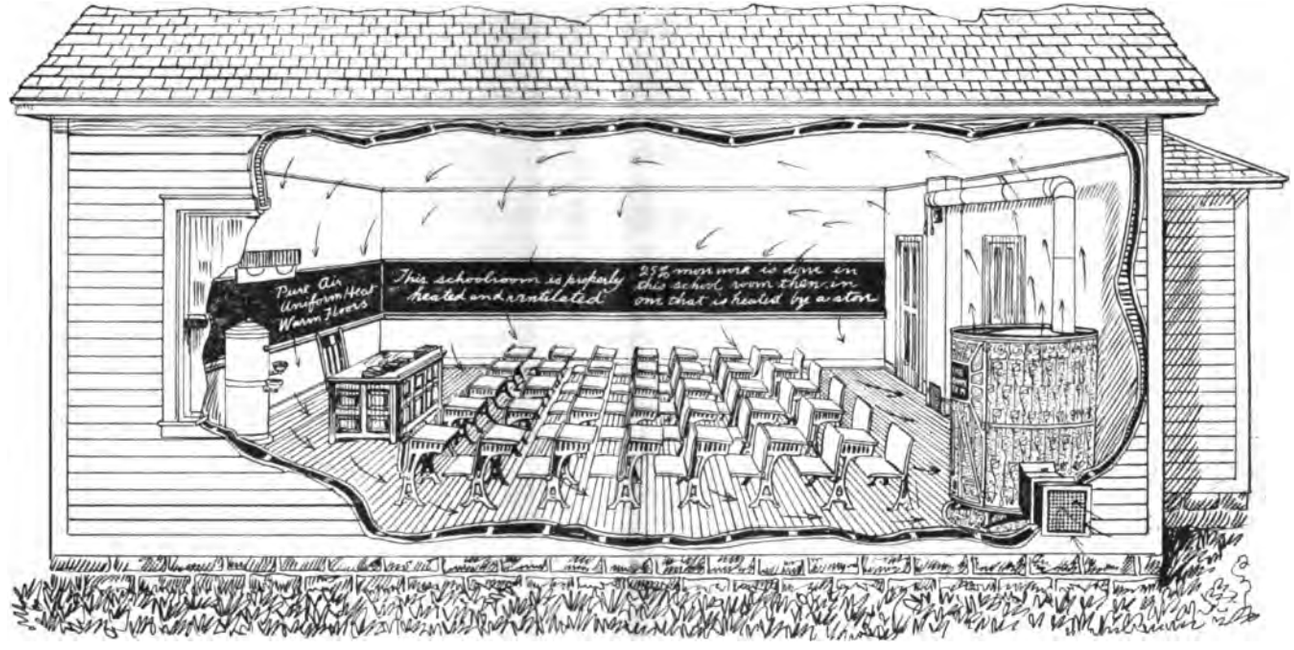
Solution of the Problem.—This problem can be solved either by a stove furnace installed in the room or adjacent to it or by a basement furnace. There are systems sold by various companies at prices varying from $110 to $125 which not only heat the room evenly but ventilate it thoroughly. Cold air is brought from the outside. It passes between the heated surface of the stove and a heavy jacket, is warmed, rises to the ceiling and scatters about the room. A large pipe with an intake about eight inches from the floor draws off the foul air, which as it cools becomes heavier and goes down. As it is drawn off, the warm air takes its place. In this way a complete circulation of air is secured. The amount of fresh air supply and foul air escape can be regulated. In order that these systems may work satisfactorily, the building must be fairly tight as openings around the doors and windows and especially in the ceiling will interfere with the air circulation. There are about 2500 of these systems in use in Michigan. The manufacturers install them on trial, fully guarantee them and do not demand payment until satisfaction is given. Manufacturers that have plants in operation in this state are: Waterman-Waterbury Co., Lansing, Michigan; Smith System Heating Co., Minneapolis, Minnesota; Beckwith Stove Works, Dowagiac, Michigan; Hart Heating Co., Grand Rapids, Wisconsin; Marshall Furnace Co., Marshall, Michigan, and possibly others.

A Home-Made System.—It is possible for a district to make its own heating and ventilating plant if it possesses a heavy cast iron stove. The heavy stove is essential as a light stove is soon burned out. The following directions are given by Superintendent Frances G. Blair of Illinois:

At the corner of the house cut a hole in the foundation wall and another through the floor where the stove is to stand. Connect these openings with a galvanized iron conduit and surround the stove with a heavy galvanized iron jacket about eight inches from the sides of the stove. The jacket should reach and be fastened to the floor and be extended to a height of five feet. There should be a door in the jacket through which fuel may be placed in the stove and through which the ash box can be removed. There should be another door at the bottom of the jacket. It should not be on hinges, but should be so attached that it may be raised or lowered. It should be twelve inches wide and eighteen inches

high. The hole in the floor should be 12x16 inches and provided with an ordinary hot air register, thus making it possible to regulate the amount of air admitted or shut it off altogether. When the room is to be heated quickly the register should shut out the outside air. By opening the sliding door in the jacket, the air within the room is admitted to the furnace. When the room is sufficiently warm and the children are present, the register should be opened and the sliding door closed.

In order that fresh air may flow into the room through the furnace, it will be necessary to provide that an equal amount of foul air escapes through the room. This can be done by attaching a ten-inch galvanized pipe to the jacket and extending it from within six inches of the floor upward through the roof. This will take air off the floor outside the furnace. It should be provided with a damper that it may be closed when on very windy days the air might come down the pipe.


Pure Air
Uniform Heat
Warm Floors
This schoolroom is properly heated and ventilated
25% more work is done in this school room than in one that is heated by a stove

This shows how a heating and ventilating system operates. The circulation of the air is indicated by arrows showing the air being drawn in from the outside, heated rising to the ceiling and scattering about the room, going down as it cools and being drawn off at the floor by the foul air extractor.

The Basement Furnace.—The basement furnace is either the best or the worst method of heating the schoolroom, being dependent upon the arrangement for the cold air supply. If this supply comes from out-of-doors and proper provision is made for the escape of foul air, it affords the best system. If, however, basement air is used or if the cold air is drawn off the floor, reheated and sent back to the children to breathe over again, it is the worst system. It is advisable to have a cold air pipe from the room to the furnace in order to heat the room quickly in the morning and for use in severe weather but it should be closed as soon as the room is warmed in the morning and the outside air supply used exclusively the remainder of the day. The heat register should be placed in the wall near the ceiling and not on the floor to become filled with dirt and dust. The cold air register should be in the wall rather than the floor for sanitary reasons though its position should be near the floor rather than the ceiling. A small heat register in the floor is often found desirable as a foot warmer.

It is as vital to remove the foul air as to force in the warm air. The preferable ventilating arrangement is a double chimney with a register as large as the fresh air intake near the bottom of the shaft. If the chimney is not double but at least 12x12 inches inside measurement, it can be made to serve for ventilating purposes by putting in an eight inch opening and attaching by means of an elbow an eight inch pipe which should extend down to within six inches of the floor. It should be open at the bottom and provided with a damper. If the chimney is too small for this, the best way out of the difficulty is to build a new chimney or where this cannot be done extend a twelve inch pipe from within six inches of the floor up through the roof. Most of the arrangements for removing the foul air found in schoolrooms are altogether inadequate.

CORRECT LIGHTING

It is exceptional to find a schoolroom properly lighted and with correctly installed window shades. As a result children and teachers by the thousand are working under conditions which bring injury to their eyesight. While hundreds already are wearing glasses because of this injury, fully as many others need the attention of oculists. A much heavier demand is made upon the eyes in this age than formerly and unless proper lighting is found in schoolrooms, the children must suffer.

Why Unilateral Lighting is Correct.—There is, with the exception of overhead lighting, but one correct way to light a schoolroom and that is by providing sufficient window space on the left side of the children, with no windows in any other part of the room. If windows are found on opposite sides of the schoolroom, the children suffer from injurious cross lights; if the windows are on the right side, the children shade their work with their hands while writing or figuring; if the windows are in the rear, the children shade their work with their bodies while the teacher is forced to face a glare of light which sometimes is almost maddening; a window in front of children is all but criminal as is the use of blackboards placed between windows for the eyestrain under those conditions is most injurious. If the windows are correctly installed on one side of the room, and the walls are properly tinted, there will be sufficient light in every part of the room.

What a Careful Test Shows.—In Cheboygan County, Michigan, a very careful test of the eyesight of children in the rural schools was made recently. Ten years ago, a building was constructed in that county with the windows entirely on the left and in the rear. The rear windows have been kept shaded so the light has come almost entirely from the left. The walls have always been tinted a buff with a light cream ceiling. In that school was found but one child with defective vision and this pupil comes from a family affected with weak eyes. In other schools in the same township where the buildings are improperly lighted, the percentage of defective vision is well above fifty. In the examination of 2104 children of the rural and village schools, 64 per cent were found to have defective vision in some form. In some schools where the windows were on both sides of the room and the walls decorated in dark colors and with blackboards placed between windows more than two-thirds of the children had defective vision and in one, every child was so afflicted. The percentage of children having defective vision found in the modern well lighted schoolrooms is so noticeably slight as compared with the percentage found in the poorly lighted, the incorrectly lighted and the improperly decorated rooms as to prove that modern ideas of lighting are correct and that school children today are actually being made spectacle wearers and are having their eyesight injured where they are compelled to attend school in the poorly lighted, the incorrectly lighted and the improperly decorated room.

Properly Installed Window Shades a Help.—In the sections devoted to remodeling and construction specific directions will be given in regard to proper lighting but in this section attention is called to the most desirable kind of window shades and their correct installation. The purpose of a window shade in a schoolroom is to shut out the glare of the sun but not the light. Translucent shades, those through which the light penetrates easily, should be used instead of the heavy opaque green shades which exclude practically all light. The translucent shades should be lemon, orange or tan in color, never red or white as both are very trying. Such shades installed according to the directions given below will greatly increase the amount of light admitted into the schoolroom and when carefully regulated by the teacher will minimize the injury resulting from the cross light in rooms which are lighted from opposite sides.

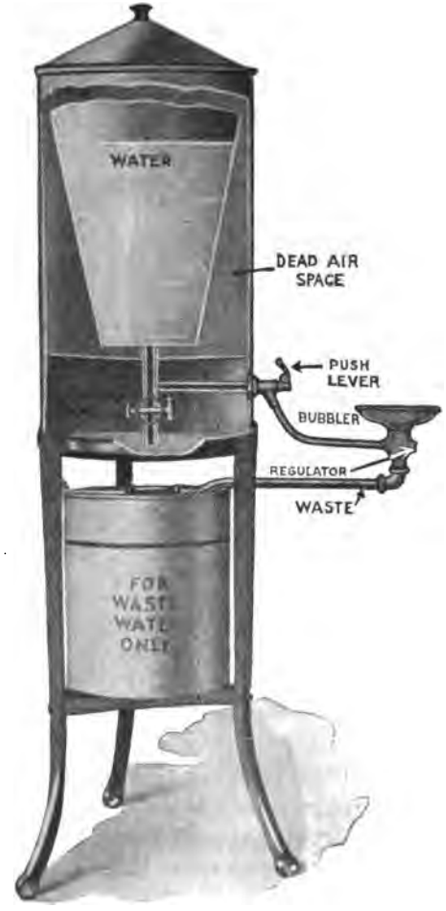
How to Install Shades.—The shades should be hung at the bottom of the window instead of the top. The same fixtures may be used with the addition of a little pulley and cord so that the shade may be pulled up rather than down. The common sense of this arrangement will be appreciated at once. The glare of the sun is shut off from some particular desk but the remainder of the light is admitted to be reflected from the ceiling to the work of the pupils. If there are windows on opposite sides of the room and those on the right cannot be eliminated the teacher by raising the shades halfway on the side from which the light is stronger can do away almost entirely with the cross lights which work injury to the eyesight. In case there are windows in front of the children and a rearrangement of seats will not eliminate them, a heavy green shade should be tacked over the windows making it impossible for light to be admitted.

This illustration shows how the windows should be placed entirely on the left side and also the right and the wrong way to hang window shades. Those on the right are hung at the top and in order to shut out the glare practically all the light must be shut out. Those at the left are hung properly and though the glare is shut out a great deal of light is admitted to be reflected from the ceiling to the desks of the pupils.

Expense of Shades is Small.—As the expense of installing properly the right kind of shades is so small, this improvement at least can be made in every district to lessen the danger of injuring the eyesight of children and teacher. Shades and the necessary fixtures can be secured from almost any furniture dealer or department store. Good quality of oil shades can be purchased at prices varying from 90 cents to $1.50 depending upon the size of the windows. It is poor economy to buy cheap watercolor shades as they soon become shabby in appearance and wear out quickly.

SANITARY WATER SUPPLY

Of utmost importance to the health of children is the purity of the drinking water supplied for use in the schoolroom. The contam nation of the water supply from outhouses and the use of surface water wells are two of the greatest causes of typhoid fever known. If outdo outhouses are in use, they should be placed as far as possible from the well and on ground lower than the well so that there will be less dang from drainage. The Michigan law requires the board to furnish a water supply but unless it is pur the State Board of Health has authority to condemn it so every precaution should be taken to secure pure supply.



Interior of drinking fountain showing construction.

Construction of the Well.—The driving and construction of the well is most important. The o custom of digging a well has been abandoned and wells are driven today. Too frequently, howeve the wells are not driven deep enough as many people do not realize the danger of surface water well The well should be driven through "hard pan" so that there will be no danger of surface water suppl If out-of-doors, the top of the well should be cemented so that drainings from the pump will n follow the well down to the original source of the water. Whenever possible, the well should be locat on the schoolgrounds and the pump placed inside the school building, this being a distinct convenience and prevents freezing and misuse which causes trouble in many districts. With the use of an enameled sink, a most satisfactory arrangement for washing can be provided. A pail may be used for the waste water but the most desirable method is a trapped drain pipe, to carry the waste water at least twelve feet from the building.

Common Drinking Cup Dangerous.—The dangers of the open pail and common drinking cup are too well known to need much mention. The mouth is a veritable incubator of disease germs and these are most easily transmitted by the drinking cup. The open pail permits the water to become stale quickly, receives dust and disease germs and often the portion in the cup which the child has not drunk. The pail and common cup are recognized today as among the greatest sources of tuberculosis, pneumonia, colds and other contagious and infectious diseases. As a substitute the individual cup has been tried and found a failure in the schoolroom for three reasons. It is almost impossible for the teacher to prevent the children from trading the cups. The cups are seldom kept away from the dust which arises when the floor is swept. They are rarely scalded out. When the cups are dipped into a common water pail, all their advantages are lost.

Children can drink in comfo and safety as water is kept clean and cool.

An Effective Solution.—This problem is best solved by the purchase of a sanitary bubbling drinking fountain. These fountains hold from six to ten gallons of water and are built on the principle of a fireless cooker so that they keep the water fresh and cool for six hours. A child drinks from them without touching his lips to any met portion. They can be drained at night so there is little danger of freezing. They cost $13.25 for the six gallon size, $15 for eight gallon si and up. They are manufactured by Dail Steel Products Company, Lansing, Michigan; Gier & Dail Company, Lansing, Michigan; Waterma Waterbury Company, Lansing, Michigan; Smith System Heating Company, Minneapolis, Minnesota, and possibly others.

SEATING FOR HEALTH AND COMFORT

›bably no other thing contributes so generally to the discomfort of school children as improper seating arrangements and this fact to cities and towns as well as rural districts. Graded school officials assume that all the children in the fifth grade, for instance, are .e size and so equip the room with one sized seats and desks despite the fact that fifth grade children vary decidedly in size. In rural the room is usually equipped for the comfort of the advanced pupils and the smaller ones are forced to suffer. As a result of these ns, it is difficult to find a schoolroom in which some children do not have to sit all day with their feet several inches from the floor because s are too high, or must distort their backs because the desks are too high, too low or too far away.

›se conditions tend to cause spinal weaknesses and are largely responsible for rounded shoulders, hollow chests, projecting chins, shoulders. They make for discomfort which means that the children are not able to do their work as efficiently as they should for no can work satisfactorily when uncomfortable. They cause restlessness which interferes with the proper discipline of the school.

This shows why seats of the same size should be placed in the same rows from front to back, otherwise a child often sits in a seat that is too high for the desk in front of him. The last three seats in the row are of the same size so the difference between the right and wrong way can be seen.

›eating Usually Necessary.—The first thing necessary to improve seating conditions usually is to re-seat the room as it is the exceptional ıere the seats and desks have been properly installed. Instead of the small-sized desks being placed in front, the row reaching from ›ide, they should be placed in the same row from front to back. That rule holds good for all desks, the same sized desks should be placed ›ame rows from front to back. Otherwise you have a child seated in a seat too high for the desk in front of him. The placing of the the same size in the same row from front to back also aids in the discipline as frequently some of the older pupils should be in front

angement of Seat and Desk.—There is an almost universal tendency to place the desk too far from the seat, forcing the child to lean and rounded shoulders are the result. The child should be able to sit erect with his feet placed firmly on the floor and his back resting the back of the seat, the desk in front of him coming within two inches of his body. The desk should be low enough to permit the to rest easily on it yet not so low as to cause stooping.

The ordinary desks come in the following sizes:

No. 6 for children 6 and 7	No. 4 for children 10 and 11	No. 2 for children 14 to 16
No. 5 for children 8 and 9	No. 3 for children 12 and 13	No. 1 for adults

In placing the desks the following rule for proper distance will be helpful:

No. 6, eight inches	No. 4, ten inches	No. 2, twelve inches
No. 5, nine inches	No. 3, eleven inches	

This district was progressive enough to install a heating and ventilating system, tint the walls and provide a drinking fountain, but it permits children to sit in double seats that are entirely too large, so that some children cannot touch their feet and practically all must twist their bodies and shoulders in order to work.

If it is necessary to place two sizes of desks in the same row, a "rear" of the same size as those in front should end the half row of that size and a "front" of the same size as those to complete the row should be placed close to it. In arranging the seats and desks according to these directions, the appearance of the room may not seem quite as symmetrical as the more common way, but the comfort and health of the children will be given attention, which is vastly more important.

Small-sized Desks Essential.—No school board should delay the purchase of small-sized desks and seats if the present supply is inadequate, a condition which exists in the great majority of schoolrooms. It is not only cruel to force little children to suffer discomfort, but it endangers their health to require them to sit in seats when they cannot touch the floor and when they must distort their backs in order to work.

Cost of Seats and Desks.—For a district to re-seat the schoolroom entirely is not an expensive proposition. Single desks should always be purchased even if only a partial supply is ordered as under no circumstances should more double desks be added. The advantages of the

Adjustable desk with an adjustable chair. Both can be raised or lowered to fit the individual child.

single desks far outweigh the slightly greater cost as they make for better discipline, health, efficiency and morals. Satisfactory cast-iron single seats can be purchased at an average cost of $1.75, though the price for a thoroughly first-class one would be somewhat higher, possibly $2.15. The average cost for a steel article is $2.65. An estimate can easily be made of the expense of reseating for any particular school. There is practically no district in the state but that can afford this improvement or at least can provide itself with sufficient small-sized desks.

Adjustable Seats and Desks.—The best solution to the seating problem is the adjustable desk which makes it possible to fit each individual almost perfectly. This is a particularly effective solution for the country district for there, within two or three years, the demand may change from small-sized desks to large. With adjustable seats and desks this change can be taken care of without the purchase of new material. The stationary adjustable seat and desk is built so that by the use of a wrench either the seat or desk may be raised or lowered, while for fifty cents additional a sliding top may be secured. This makes it possible for the child to have the desk nearer his body when desirable for certain kinds of work and also solves the problem of the child who is especially fat or thin. The steel adjustable seats and desks cost from $3.20 to $3.50, the cast iron from $2.10 to $2.50 each dependent upon the size. Adjustable seats and desks are made by American Seating Company, Chicago, Illinois; Sears, Roebuck Company, Chicago, Illinois; Haney School Furniture Company, Grand Rapids, Michigan, and possibly others.

THE TOWEL QUESTION

The common roller towel which is so frequently seen in schoolhouses is the cause of practically every skin disease epidemic among children and sometimes even of blindness. Clean hands and face are quite essential in the schoolroom but they should be possible without any risk to health.

The Question Answered.—There are two ways to meet this situation. Either individual towels should be provided by the pupils or paper towels by the school board. Under any condition, the common towel should be abolished. The paper towels are not as expensive as might be imagined. They cost about ten cents a hundred, which is almost as cheap as keeping roller towels properly laundered. The paper towels are an expensive proposition, however, unless they are used properly, so the teacher should instruct the children in this matter and should see that there is no waste. The towels are to be used as blotters and in this way the flesh can be thoroughly dried. Liquid soap, while not as essential as the paper towels, adds to the hygienic aspect of the school. The towels are manufactured by the West Disinfecting Company, Detroit, Michigan; Scott Paper Company, Detroit, Michigan, and possibly others.

Paper towels.

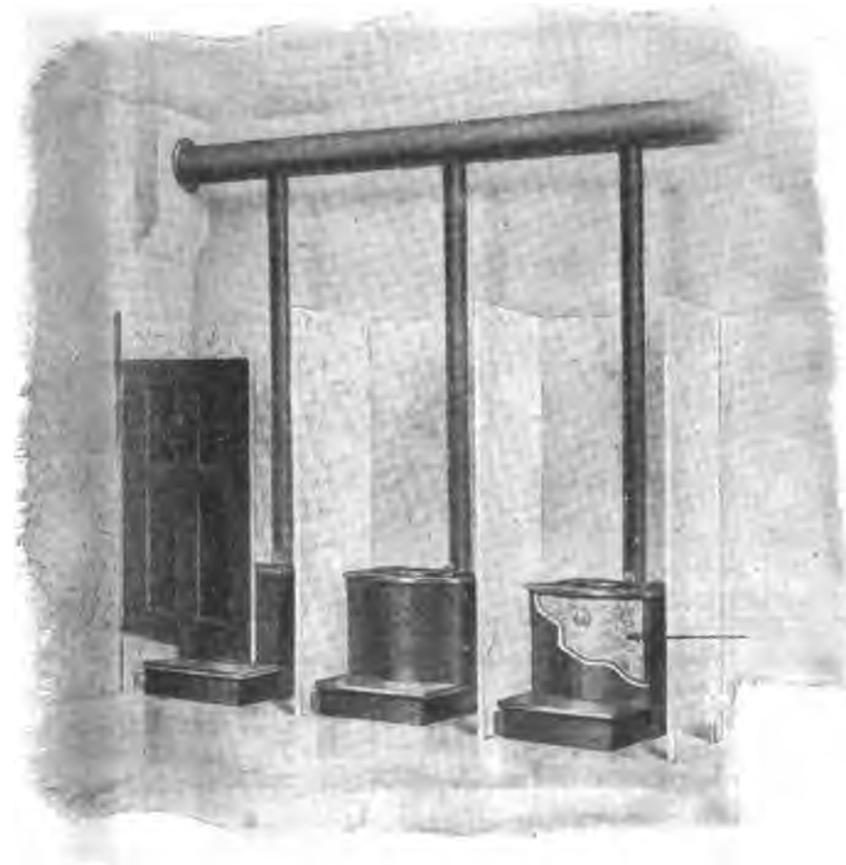
THE OUTHOUSE PROBLEM

The out door outhouse has presented the most perplexing of all problems to the rural district. Even under the best circumstances, it is a menace to health and frequently to morals. Unless every precaution is taken by a frequent disinfection for guarding against flies and danger of contamination of the water supply the outhouse may be a source of disease not only to the children who attend the school but to the entire community as well. The fact that the outhouses are usually dirty and the walls are often filled with obscene markings, makes them dangerous to the morals of the children who are at their most impressionable period and cannot escape the degrading influence. Even

when officers and teachers are most alert and conscientious in their duty concerning these questions, no little difficulty is experienced in keepin the buildings decently clean and in repair. Not infrequently outsiders are responsible for depredations which are a source of expense and an noyance to the district.

Indoor Chemical Closets.—The most satisfactory solution to the problem is the installing of indoor chemical closets which require neithe waterworks nor plumbing. These consist of a metal tank in which a strong chemical solution is placed. A pipe, working on the same principl as a stovepipe, removes all the odors while the chemical solution destroys the bacteria in the excretions and reduces the solid matter t liquid form. When necessary, the tanks are taken out and dumped. The frequency of dumping varies with the size of the tanks and the number of children using them but the tanks seldom need attention more often than once a month and usually six times during a nine months' school year will suffice. The action of the chemical reduces the solid matter to liquid form, thoroughly disinfects, destroying all of the bacteria effectively, so that there is no danger from dumping the tanks anywhere. As the odors also are eliminated the dumping is not disagreeable. No difficulty is experienced in regard to freezing unless the mercury goes forty degrees below zero.

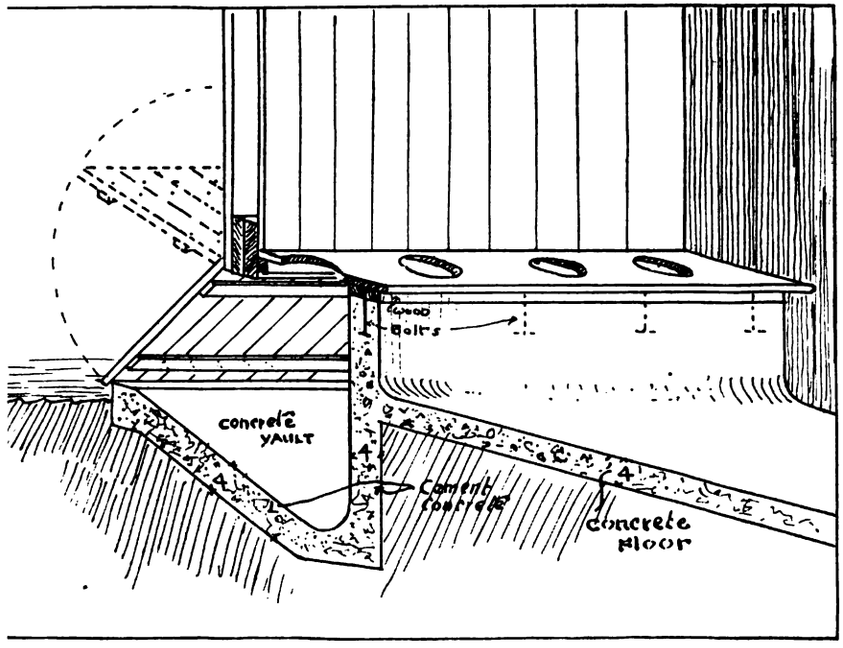
Indoor chemical closet. The chemical solution is placed in the tank, which is dumped when necessary. The cover is practically air tight, while the odors are carried off by the ventilating pipe.



Toilet room in a country school made possible by the indoor chemical closet

Advantages Plain and Cost Low.—The advantages of the indoor closets are so plain and the cost so small, that school boards are finding them the best solution to the outhouse problem. Either the cloakrooms can be partitioned off into toilet rooms or an addition made to the school building for this purpose so that the toilet rooms are under direct supervision of the teacher thus preventing the danger of uncleanliness and moral filth. The conveniences are inside the building so will be used exclusively by members of th school and will do away with all delay in visitation, which on the part of children sometimes causes illness. There is no danger of wat contamination or the closets becoming a source of disease. The cost is moderate, the closets ranging in price from $19.50 to $40, the cheap ones being adapted particularly to school purposes. There should be at least one closet for every thirty pupils of each sex. The chemic solution used in the closets will cost the school of thirty children about four dollars a year. The closets are manufactured by West Disinfectin Company, Detroit, Michigan; Waterman-Waterbury Company, Lansing, Michigan.

Outdoor Toilets.—In the rural districts, and wherever a sewer system or water supply under pressure are not available, outdoor sanitary
y closets, with movable galvanized sheet iron pails or boxes, or better still, a cement receptacle, similar to that shown in the plate, should
provided for the reception of excreta. Dry loamy earth, wood ashes, sifted coal ashes, or air-slaked lime, should be applied to the excreta
least once in each day, and the contents of the receptacles removed at frequent periods. The urinals should be of non-absorbent material
d made to discharge, through proper drains, into the soil at a safe distance from any source of water-supply. Where economy is not an object,
d a proper outlet for a sewer is available, inside toilet accommodations may be had in any such schoolhouse by the installation, in connection with the well, of one of the patented storage tank and pump outfits designed for such purposes, and by the passage of the sewage through a proper purification plant.



It is recommended that the interior of this building be sided with a corrugated metal sheathing and that this sheathing be painted a light drab. If, while the paint is still wet the surface be sanded, it will then present a surface which will not invite lead pencil marking, and being composed of metal, it will not be subjected to the whittling which is so frequently observed in school house toilets.

In the boys' closet a urinal should be constructed along one end. This building should be shielded from view by a lattice parking and it would be well to construct a urinal inside of this parking but outside of the building to be used by the boys.

Each and every closet of any type, and every urinal section should be provided with an adequate local vent, and these should be connected with a vertical flue extended to a point above the roof.

Law Governing Outhouses.—The following extract from Act No. 255 of the Public Acts 1911 should be taken into consideration and enforced in every school district.

Sec. 3 (c). "Provided, That it shall be the duty of the county truant officer, when requested to do so by the County Commissioner Schools, to inspect the outhouses in primary districts and order repairs on the same, and in case the District Board, after proper notification by truant officer, fails to have such outhouses put in proper and sanitary condition, it shall be the duty of the said truant officer to have such rk done at the expense of the district.

Engineering Bulletin No. 3 of Public Health published by the Michigan State Board of Health, How to Construct a Sanitary Dry Earth oset, may be procured free upon application to the Michigan State Board of Health, Lansing, Michigan.

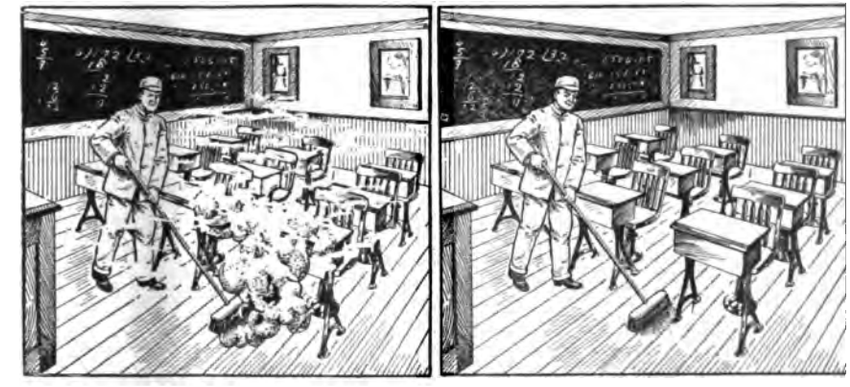
MISCELLANEOUS EQUIPMENT

Blackboards.—As a great deal of efficient work on the part of the teacher and pupils depends upon adequate blackboard room, school ards should provide a sufficient amount. It is important that the blackboards should not be installed higher than twenty-six inches from floor in order that the smaller pupils may work easily without straining in reaching. The boards should never be placed between windows the child who tries to make his eyes see the work on the board while facing an unshaded window is under a tremendous eyestrain which most injurious. Whatever material is purchased for the boards, a dull finish should be demanded thereon as otherwise the children are subted to a reflected glare.

Disinfectants.—The proper use of efficient disinfectants would largely eliminate danger of epidemics of contagious and infectiou A schoolroom should be thoroughly scrubbed and the woodwork and furnishings such as seats and desks washed at least once a month in which a good disinfectant is placed.

Dust Reducers.—While a broom may gather up the major portion of the dirt, it is a most vigorous agitator of dust. Floor b not much more expensive and stir up much less dust. A sweeping compound to be used on the floor is most desirable. This can be at reasonable cost or made by thoroughly mixing five quarts of common paraffine oil, which costs about 20 cents a quart, with a bar grade sawdust. Only a few handfuls of this are needed at each sweeping. The feather duster is an abomination as it merely sc dust. It should be replaced by dustless cloths which may be purchased or made as follows: Put in large bottle or can 1 part 1 part sweet oil, 1 part grain alcohol, ¼ part vinegar. Shake this well before using. Dampen piece of cheese cloth just before us will pick up all dust and also take out all stains from the most delicate woodwork. It may be used as often as desired.

Floor brush which cleans the floor better than a broom and stirs up less dust. Those equipped with oil chambers are the best as the dust is reduced to a minimum.



No sweeping compound. Sweeping compound used.

While there is no chalk dust which is free from dust, the better grades produce the least amount and the difference in price is t fact, the better grade will be found cheaper in the end as it lasts longer. A good blackboard cleaner may be made as follows: Fol of unbleached cheese cloth into yard square, sprinkle thoroughly with kerosene oil and roll up tightly. Dampen a heavier cloth in k (factory cotton doubled is good). Wrap heavier oil-dampened cloth around the roll of cheese cloth and lay away for three days. cloth roll is then ready for use on the blackboards. Never put more oil on the inside cheese cloth, but keep the outside heavy rag roll the cheese cloth inside of this oil-dampened cloth when it is not in use. Too much kerosene on the inner rag will make the bo When the inner cloth gets black on one side, fold the dirt out of sight.

Dangerous Articles.—Schools which use the common water pail, common drinking cup, common roller towel, common comb, t broom, cheap chalk and the feather duster endanger the health of pupils and teachers.

Necessities.—The law requires the director to provide among other things a set of wall maps of the United States and Michiga a dictionary, reading chart, bookcase and various articles for stove and toilet equipment. The director is limited in the amount he m for these articles unless the board authorizes a greater amount. Every schoolroom should have a modern dictionary as such a vol not only as a dictionary but an encyclopedia as well. Several small dictionaries for individual use are also desirable as are small globes which may be purchased for thirty-five cents each.

Needed Equipment.—A sand tray, which can be made at any hardware store at a cost of less than one dollar, is invaluable for history and primary busy-work. The trays should be from three to four feet long, two feet wide and about six inches deep, made of

iron. Painting the bottom blue adds to the effectiveness of the sand maps. An outfit consisting of a set of scales, weights, measures of all kinds and toy money is vital for practical arithmetic. A Babcock milk test costs but $4 and together with rag doll seed testers and planting trays will aid greatly in the work in agriculture and be helpful to the entire community. An emergency outfit for use of teacher in caring for injuries or attacks of illness among the pupils should be in every school building. Kindergarten table and chairs, a thermometer, clock, high earthen jar to serve as an umbrella rack, a good teacher's desk and chairs for the teacher and visitors should be provided. A metal door mat placed in the vestibule will prevent a great deal of dirt being carried into the schoolroom.

Desirable Equipment.—The city and town schools have found vocational training not only advantageous when the definite development of children is concerned along those lines but a stimulus to their academic studies as well. Various progressive rural districts are finding these subjects possible and valuable in their schools. An oil stove, cooking and baking utensils take care of the domestic science work while little equipment is needed for sewing and other phases of domestic art. A work bench, equipped with ordinary tools such as find a place in a farmer's toolhouse, makes manual training possible for the boys.

MOST IMPORTANT NEEDS

After a schoolroom is made healthful and comfortable by the introduction of equipment, the next most important consideration is the securing of those things which will aid in the building of the right kind of character. The child spends from four to six hours a day inside the schoolroom and the influences he meets with there determine to a great extent his entire life. A well selected library of books suitable for children and a few well framed prints of masterpieces are of more vital importance than globes, maps or other school equipment.

Habit of Reading.—The habit of reading the right kind of literature is formed in childhood and should be commenced as soon as the child is old enough to read; so the library should have books suitable for the second, third and fourth grade children as well as for the older pupils. While the books should be made up largely of good stories, some should deal with history, geography and other allied subjects.

Purchase from Book List.—The state legislature recently passed an act which prohibits school board or township boards from purchasing any library books except from a list which is issued by the Superintendent of Public Instruction and the State Librarian. The list is a broad one, however, so boards will find it an advantage to consult with the teacher, county commissioner and possibly the county normal principal, if the county has a normal, in making the choice. The books should be selected for the benefit of the children, not adults, so the best of fairy stories, tales of adventure and other types dear to children, should not be overlooked.

Young People's Reading Circle.—Michigan has a Young People's Reading Circle board which each year selects twenty-five of the most desirable books for school libraries and these are sold practically at cost to the districts. The entire set may be purchased or any portion of it. A certificate is given the pupil who reads sixteen of these books and for each additional five read, a gold star is affixed to the certificate. The books, supplies and information concerning the plan can be secured from C. F. Pike, Manager, Wyandotte, Michigan.

Free Traveling Libraries.—Upon application to Mrs. Mary Spencer, State Librarian, Lansing, Michigan, the loan of a library of fifty books, especially graded for children, together with a neat bookcase, may be secured for six months or less, when it may be returned or replaced with another library of different books. The only expense to the school district is the freight and drayage between the district and Lansing. Under the same plan, framed prints of the world's masterpieces, ready to hang on the walls of the schoolroom, will be sent to school districts so there is no reason why any school in the state of Michigan should be without desirable books and pictures.

The refining influence of good pictures and books will be felt by every member of the school. Children especially learn to love certain pictures and are unconsciously affected by them.

Free Aids to Teachers.—The following manufacturing concerns will send interesting and helpful school exhibits at little or no expense for use in the schools.

AVAILABLE ILLUSTRATIVE MATERIALS

I. Pictures free.

1. Singer Sewing Machine Co., Cincinnati, O.
2. International Harvester Co., Chicago.
3. Railroad and Steamship Companies.

II. Pictures costing one cent and more.

1. Perry Picture Co., Malden, Mass.
2. Brown Picture Co., Beverly, Mass.
3. C. M. Parker, Taylorville, Ill.
4. I. L. Hood, Lowell, Mass.
5. A. W. Mumford, New Rand McNally Bldg., Chicago.

III. Traveling Art Exhibits. Terms on application.

1. H. K. Turner Co., Boston, Mass.
2. R. M. Elson Picture Co., Boston, Mass.
3. Library Bureau, State of New York, Albany, N. Y.

IV. Lantern Slides, Lanterns and Screens. Loaned.

1. Service Bureau, International Harvester Co., Chicago.
2. John Hamilton, Farmers' Institute Specialist, Washington, D. C.
   List of printed lectures illustrated with stereopticon slides—free.
3. Library Bureau, State of New York, Albany, N. Y.
4. Keystone View Co., Meadville, Pa.

V. Government Bulletins.

1. Office of Experiment Station, Washington, D. C.
2. United States Dept. of Agriculture, Washington, D. C.
3. State Experiment Stations.
4. State Colleges of Agriculture.
5. State Dept. of Agriculture.

VI. Outline Maps costing one cent and more.

1. McKnight & McKnight, Normal, Ill.
2. McKinley Publishing Co., Philadelphia, Pa.
3. University of Chicago Press, Chicago.

VII. School Exhibits free to school departments.

1. Silk and Silk Products.
   Belding Bros. Co., New York City.
   Nonotuck Silk Co., Florence, Mass.
   Cheney Bros., South Manchester, Conn.
2. Cocoa and Chocolate.
   Walter Baker Co., Dorchester, Mass.
   Walter M. Lowney, Boston, Mass.
   Huyler's, 62 Irving Place, New York City.
3. Cotton and Cotton Products.
   Hoosier Sheeting Co., Cannelton, Ind.
   The Tennessee Cotton Oil Co., Memphis, Tenn.
   White Oak Cotton Mills, Greensboro, N. C.
4. Thread.
   Clark Thread Co., East Newark, N. J.
   The Spool Cotton Co., 8 White St., New York City.
   George R. Clark & Bros., New York City.
5. Linen. Cabinet illustrating manufacture of linen, $3.00.
   The Linen Thread Co., 98 Franklin St., New York City.
6. Wool.
   Lone Star Woolen Mill Co., Minneapolis, Minn.
   Globe Woolen Co., Utica, N. Y.
   Thomas Oakes & Co., Bloomfield, N. H.
7. Shears.
   Weiss & Sons, Newark, N. J.
8. Manila, Hemp and Sisol.
   International Harvester Co., Chicago.
   McCormick Twine Co., Chicago.
   New York Cordage Co., 79 Wall St., N. Y.
9. Needle Exhibit.
   H. Milward & Sons.
   U. S. Needle Co., 565 Broadway, N. Y.
10. Products of Corn.
    Corn Refining Co., New York City.
11. Sugar.
    Sugar Refining Co., Brooklyn, N. Y.
12. Spices.
    Stickney & Poor Spice Co., Boston, Mass.
    Thompson, Taylor & Co., Michigan Ave., Chicago.

AVAILABLE ILLUSTRATIVE MATERIALS—(Continued)

13. Vanilla.
    Joseph Burnett Co., Boston, Mass.
14. Cereals.
    Postum Cereal Co., Ltd., Battle Creek, Mich.
15. Soap.
    Proctor & Gamble Co., Cincinnati, O.
16. Cattle and Meat Packing.
    Morris & Co., Chicago.
    Armour & Co., Chicago.
17. Petroleum.
    Standard Oil Co., 5 Wabash Ave., Chicago.
18. Rock Salt.
    Diamond Crystal Salt Co., St. Clair, Mich.
19. Wheat Products.
    Washburn, Crosby Co., Minneapolis, Minn.
    Western Consolidated Milling Co., Minneapolis, Minn.
20. Rubber and Rubber Goods.
    Hartford Rubber Co., Hartford, Conn.
21. Paper.
    Butler Paper Co., Monroe St., Chicago.
22. Graphite and Pencils.
    Eberhard, Faber Co., New York City.
23. Steel Pens.
    Esterbrook Pen Co., New York City.
24. Samples of Fertilizers.
    The Zerecki Chemical Co., Sandusky, O.
25. Minerals.
    Phosphoric—Federal Chemical Co., Columbus, Tenn.
    Potash—German Kali Works, New York City.
    Case of 24 metals and minerals, price $2.00, A. Flanagan Co., Chicago.
26. Baking Powder.
    Royal Baking Powder Co., 135 William St., New York City.

VIII. Seeds.

1. Congressman of your district—penny packages.
2. School Flower Mission, Cleveland, O.
3. Pop Corn—H. L. Gell, Swanton, O.

IX. Booklets.

1. "From Wool to Cloth," excellent illustrations suitable to mount, American Woolen Co., 225 4th Ave., New York City.
2. On Food, Franco-American Food Co., Jersey City Heights, N. J.
3. On Food, Horlick's Malted Milk Co., Racine, Wis.

X. Charts of Food Products.

1. 15 excellent charts, price $1. Supt. of Public Documents, Washington, D. C.
2. 1 chart, extracts from U. S. charts, free. J. W. Beardsley's Sons, New York City.

XI. Rocks.

An excellent collection can be made as one travels in various sections of the country.

XII. Graphs.

Graphs showing at a glance important facts concerning various phases and facts of agriculture, U. S. Dept. of Agriculture, Washington, D. C.

Graphic charts and maps can be made by getting data from The World's Almanac; by means of blue print paper the charts can be made permanent. Directions for using the blue print paper can be obtained from an architect or surveyor. 1910 Census Report, facts graphically shown, U. S. Census Bureau, or U. S. Senator, or Congressman.

XIII. Soil.

Soil Survey Report and Map of your county or state, from Congressman.

XIV. Collections.

1. Pure seeds, grass, cereals, etc., to show pupils what pure seeds look like, Cleveland Flower Mission, Cleveland, O.
2. Weed Seeds, all local weeds to lead child to study weeds and their uses and control.

AVAILABLE ILLUSTRATIVE MATERIALS—(Continued)

3. Wood, local varieties, to know best varieties so as to be able to harvest and plant trees intelligently.
4. Have pupils bring anything of educational or local interest.

XV. Exhibits.

Exhibit bottles can be purchased from Eimer & Amend, 1205 3rd Ave., New York City.

XVI. Making of Charts.

Production of cereals—mount on cardboard pictures, post cards, etc., showing plowing, sowing, harvesting, etc., of grain. Also fasten on the cardboard vials filled with cereals of all kinds.

Likewise all sorts of charts can be made.

The Bureau of Education, Washington, D. C., issue a large number of helpful bulletins some of which are sent free and for others a slight charge is made.

The Department of Public Instruction is continually publishing valuable bulletins which are sent free upon application or are distributed to teachers by the commissioners.

Following is a partial list:

Bulletin No. 1. Regulations governing county normals.
Bulletin No. 3. Examination questions for the year.
Bulletin No. 6. History teaching.
Bulletin No. 8. Township unit system.
Bulletin No. 13. Digest of school laws.
Bulletin No. 15. Compulsory education.
Bulletin No. 16. Teachers' examinations.
Bulletin No. 21. School architecture.
Bulletin No. 23. School legislation.
Bulletin No. 29. Law for graded schools.
Bulletin No. 37. Seventy-five common birds of Michigan.
Bulletin No. 39. Juvenile corn growing associations.
Bulletin No. 40. Physical training.
Bulletin No. 42. Sanitation and contagious diseases.
Bulletin No. 43. Suggestions for physical training.
Bulletin No. 44. Agriculture in rural schools.
Bulletin No. 45. Third grade arithmetic.
Bulletin No. 46. Fourth grade arithmetic.
Bulletin No. 47. Fifth grade arithmetic.
Bulletin No. 49. Language outline.
Bulletin No. 50. Perry's Victory Centennial.
Bulletin No. 51. Planting plans for school grounds.
Bulletin No. 52. School buildings and school grounds.
Library lists.
Course of Study for Rural Schools.
List of textbooks and prices.

The Michigan Agricultural College at East Lansing is ready to be of service to the schools of the state, especially in the teaching of agriculture, horticulture and kindred subjects. The following bulletins will be sent free upon application to the Michigan Agricultural College Extension Department:

REGULAR BULLETINS

198 Sand Lucerne.
199 Cowpeas, Soy Beans and Winter Vetch.
224 Influence of Nodules on the Roots upon the Composition of Soy Beans and Cowpeas.
230 Some Bacterial Diseases of Plants, Prevalent in Michigan.
233 Insects of the Garden.
255 Cement Silos in Michigan.
258 Insects of Field Crops.
259 Bean Production.
260 Seeds of Michigan Weeds.
262 Suggestions on Planting Orchards.
266 Poultry House Construction and Yarding.
267 Michigan Weeds.
271 Alfalfa.

SPECIAL BULLETINS

10 Sugar Beets.
47 Corn Improvement.
50 Grand Traverse Disease.
56 Drainage.
59 Small Fruit Culture.
60 Celery Culture.
61 Spray and Practice Outline for Fruit Growers.

CIRCULAR BULLETINS

3 Corn, Selecting, Storing, Curing and Testing for Seed.
11 Lime for Agricultural Purposes.
14 Top Working Apple Trees.
15 Potato Culture.
17 The Michigan Woodlot.
19 Cucumbers as a Cash Crop.
20 Starting a Lawn.

ELEMENTARY SCIENCE BULLETINS

10 Boys' and Girls' Clubs.
11 High School Agriculture.

PART II

IMPROVEMENT AND REMODELING OF SCHOOL BUILDINGS

MAKING OLD BUILDINGS MODERN

Though a building might have served a district for many years and though it violates every known principle of scientific schoolhouse construction, it is frequently impossible to secure a favorable vote for a new structure. Sometimes the building is well built as far as stability goes and is actually too good to tear down. In such a case, by the judicious spending of money, the building can be made to conform to the most important principles of correct lighting, arrangement, heating and ventilating. It is important that the remodeling shall be done according to a definite plan so that the added investment shall not come to naught.

General Recommendations.—A good foundation should be placed under the building not only for the sake of appearance but for health reasons. The schoolhouse should be as tight as possible in order to make it comfortable, to save fuel and to permit the heating and ventilating system to work efficiently, if one is installed. Cracks in the floor under the doors and around the windows do not solve the ventilation problem but merely mean cold feet, draughts and discomfort for the children and teachers, and unnecessarily large fuel bills for the district. A hardwood floor is almost a necessity if an effort is to be made to keep the schoolroom clean. The floor should be oiled occasionally and swept with a floor brush rather than a broom. With so many using the building, a soft wood floor soon becomes rough, which makes satisfactory cleaning an impossibility. The teacher's platform, found in so many schoolrooms, is a recognized nuisance and should be taken out.

Floor Plans.—In remodeling the building shown by figure No. 1, the entry is converted by means of partitions into a vestibule, separate cloakrooms with toilets; a fuel room and closet are added. The windows are closed on two sides of the room and placed entirely on the left. A heating and ventilating system replaces the stove. Single seats and desks are installed instead of the double type. Figure No. 3 represents a building which consists solely of the schoolroom, while figure No. 4 shows how it can be added to and the windows properly placed.

Interior Arrangement.—A schoolhouse should be something more than merely a single room. Separate cloakrooms for the boys and girls, if possible with toilet rooms attached, an entry way, a fuel room and, what is very desirable, a library or workroom should be a part of every schoolhouse and there is no reason why they should not all be in a single building instead of a group of separate buildings, thus reducing the expense of maintenance and being much more convenient. Several floor plans are given as suggestions but each district will have to modify them to fit the particular situation.

Cloakrooms.—If the schoolhouse merely has an entry way which is used as a general cloakroom, it should be divided by partitions into a small entry way leading directly into the schoolroom with separate cloakrooms for the boys and girls on either side with toilet rooms off of them if the indoor chemical closets are to be used. It is important that the cloakrooms should open only from the schoolroom, permitting the teacher to have supervision over them. The doors to the cloakrooms should be open at the top and bottom for the purposes of heating and ventilating.

Library or Workroom.—If it is possible to partition off part of the space as a separate workroom or library this will be found decidedly profitable. Certain work can be done to advantage in such a room without interfering in the least with the ordinary classroom activities. A glass door or partition would give the teacher supervision over the room. When the building is used for other purposes than school, the workroom can be used to store books and other material so that nothing will be disturbed or misplaced.

Fuel Room.—There is no valid reason why the fuel room should be separated from the schoolhouse, forcing the teacher to go outside to secure fuel and inviting depredation of property by passersby. It should be attached to the building with a door leading directly into it. It is desirable to have it near to the heating system. The fuel room should be made as tight as possible so there will be no dust entering the schoolroom. A concrete floor is advisable. If the district already possesses a separate fuel house that is in good repair, there is no logical reason why it cannot be placed next to the schoolhouse and a door cut through. Many districts, which now use coal, have fuel houses that if attached to the building could be made to serve not only for fuel purposes but for a workroom as well. In the same way outhouses may be attached to the building and the indoor chemical closets installed.

Correct Lighting.—The best way to solve the lighting problem in an old building, is to close up the windows in the rear and front of the room and on the right side of the children and put the windows entirely on the left side, making the glass area at least one-fifth of the floor

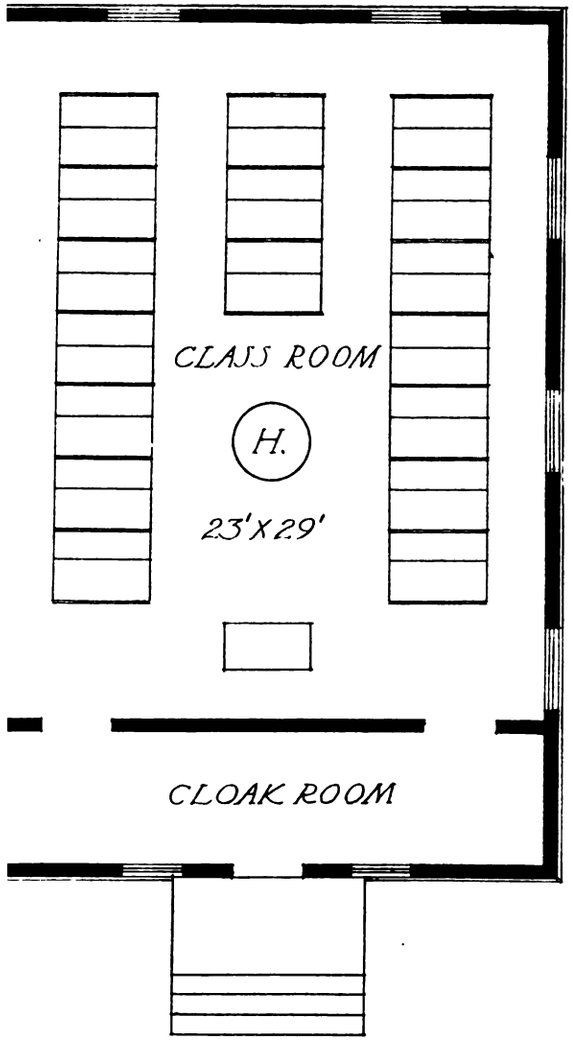


FIGURE 1

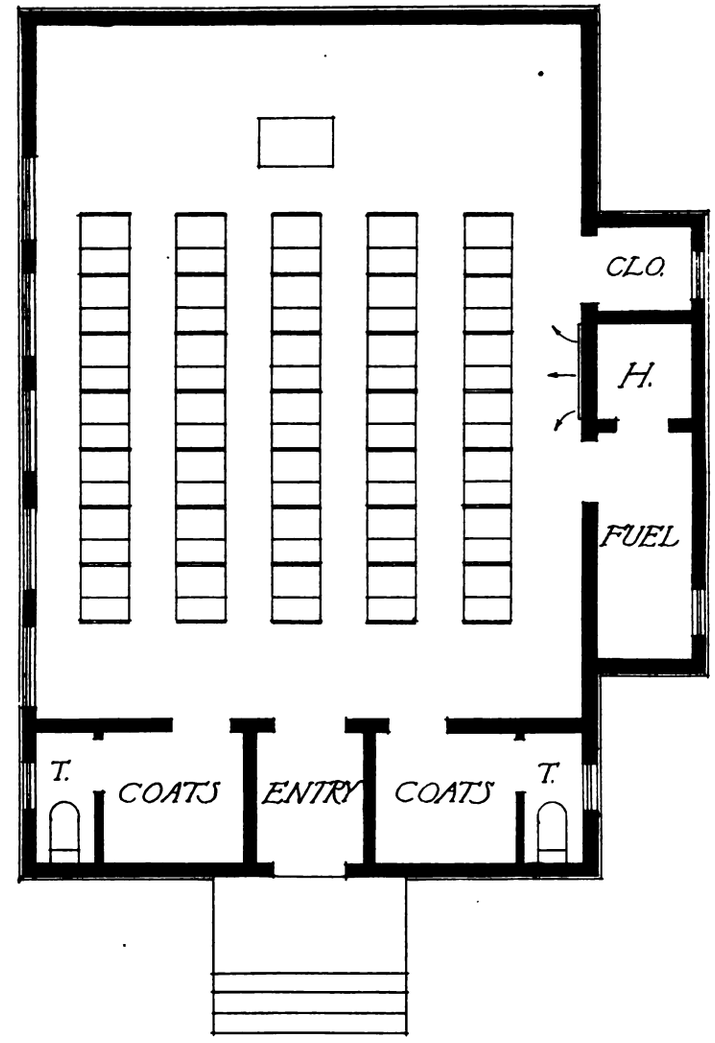


FIGURE 2

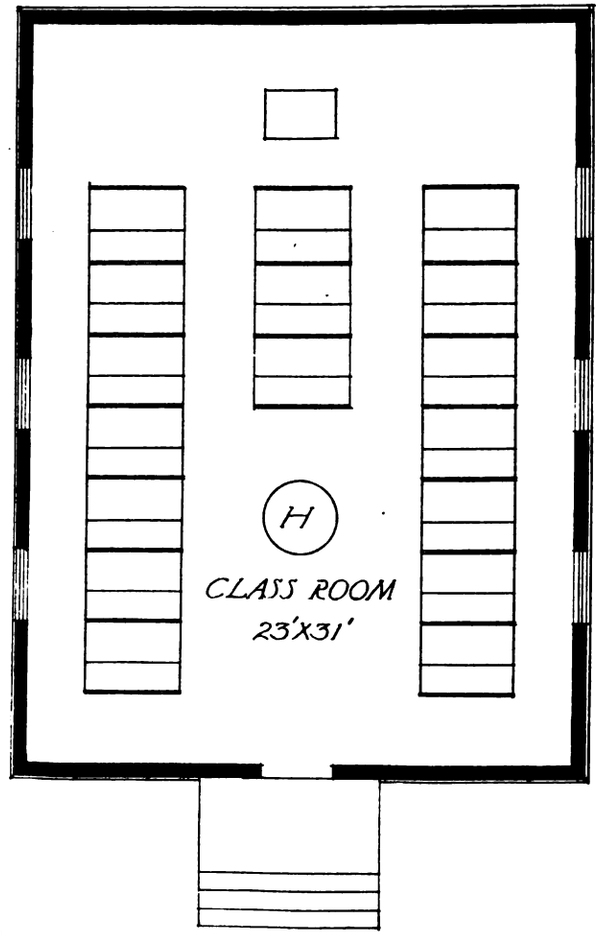


FIGURE 3

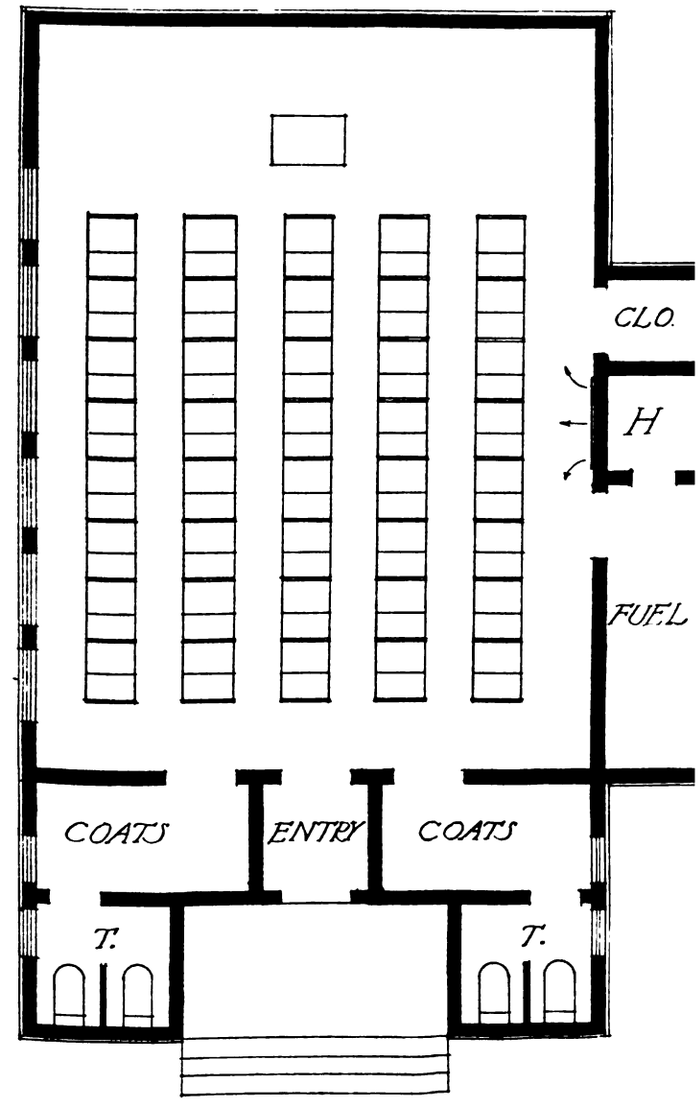


FIGURE 4

:e. This will insure sufficient light. The rapidly increasing number of children who are wearing and need glasses makes this question of ost importance.

Height of the Windows.—The lower sills of the windows should be three and a half feet from the floor as they should be higher than the s of the children when the latter are seated at their desks. In this way no light from the windows can shine directly into the children's eyes le they study. The light needed is that reflected into the eye from the book or work in front of them. Putting the bottom of the window so from the floor necessitates carrying the glass as high as possible toward the ceiling, which is valuable, as one foot of glass area near the ng is worth more than two feet at the bottom of the window. Now that steel and iron beams can be secured at slight expense, it is possible :xtend the windows within six inches of the ceiling without endangering the strength of the building. There should be as little space as ible between the windows as those spaces introduce shadows which are annoying. In the front of the room on the left side should be blank space of from four to nine feet as otherwise the children in looking toward the front of the room will face a partial glare which is very ng. Where the light is needed is upon the desks of the children.

Location of the Windows.—If possible the window side of the schoolroom should face the east. The room thus receives in the early portion he day the sunlight which is the best disinfectant. By the time to begin school the sun is high enough in the heavens to interfere but little after ten o'clock at least, use of the shades may be done away with, the clear white light of the eastern sky allowed to flood the room with- producing a glare. The light from the west is not quite as satisfactory as from the east but the light from the south is very trying. While north light is the most even, more window space is demanded and the purifying rays of the sunlight are eliminated. The rule then is, east t whenever possible, west light next, with north light as third choice and south light only if absolutely necessary.

Interior Decorating.—It is extremely rare to find a schoolroom, except in scientifically constructed buildings, where the glass area is suffi- t to provide adequate lighting—let alone too much,—so it is extremely important that the walls and ceiling of the schoolroom be properly orated in order to aid in the lighting. No dark colors should be used for any purpose as they absorb so much light. White is particularly ng on account of its strong reflection of light and the contrast with blackboards. Red is the most irritating color.

Desirable Wall Colors.—While a grayish green can be used if there is a great deal of window space, soft browns are as restful, absorb light, make a better background for pictures and are equally as artistic. For the average schoolroom, even brown is too dark, and a light is the most satisfactory for the side wall. The ceiling should be in lighter shades of tan, buff or an ivory white. The ceiling color should arried down the side walls from eighteen to twenty-five inches depending upon the height of the ceiling. A picture moulding should be l as the cost is small while the moulding improves the appearance of the room decidedly, makes it convenient to hang pictures and saves walls of the room from injury. Excellent wall tints can be secured for ten cents a pound and a pound will cover at least sixty square feet he material for the average schoolroom would cost about $2.50. It is merely mixed with water and can be applied by anyone without diffi- y. The wall tints are much cheaper, more sanitary and artistic than wall paper.

Finish of the Woodwork.—The woodwork should be of light colored woods with natural finish. If it is to be repainted, light grays or should be used in dull finish paint. Every effort should be made to reduce the reflecting surfaces in a schoolroom to a minimum, so gloss varnishes and paints are not in the least desirable.

Exterior Appearance.—If people realized that the appearance of the school building is usually taken by outsiders as an index to the thrift, perity and civic spirit of the residents of the district, more pride would be taken in keeping the property in good condition. There is no ifiable reason why a schoolhouse should be the plainest, ugliest, most illy-kept place in the district which is occupied by human beings. In- d, it should be one of the most attractive buildings to be found. It may not be possible to make some of the barn-like affairs of past years stic but they can be made and kept neat. Fresh paint will improve an old building wonderfully while an attractive porch will often fairly sform it. While it is desirable to have the building as attractive from the outside as possible, it should be remembered that the struct- is for school purposes and "the looks of the thing" should not interfere with proper lighting and arrangement of the building. The school nds should be graded if necessary, the fences always well kept and plenty of trees and shrubs used to make the surroundings attractive. h so many hardy native shrubs and trees to be found in Michigan at practically no expense, every district board should have beautiful nds as a part of the school property.

PART III

CONSTRUCTION
OF
NEW BUILDINGS

BUILDING A NEW SCHOOLHOUSE

There are certain principles that the taxpayers and district board should follow in erecting a new school building. The schoolhouse should be built for permanence and every detail be carefully considered from the standpoint of health, comfort and attractiveness as well as economy. Instead of the district perpetuating the mistakes which have been made in so many nearby localities, the board should make a study of the scientific principles underlying schoolhouse construction and secure properly drawn plans. The building should be compact and well arranged with an exterior which is artistic and homelike. The expense of erecting a building which will meet the above stated demand is but little more if any than to build one of those barnlike structures which are so universally found. Above all things else, it must be remembered that the children of the district must spend the better part of eight years of their lives within the walls of that schoolhouse during their most impressionable period so that the conditions there are going to influence their health, tastes and entire viewpoint throughout their life. It is not just to force children to spend that time in a building which is unhealthful, uncomfortable, unattractive and poorly equipped.

Location of a Site.—In the selection of a site consideration should be given to health conditions, accessibility to the pupils and general attractiveness. While the building should not be placed on a hill where it will be swept by winds, it should be located, if possible, on a rise of ground sufficient to guarantee proper drainage. It should be placed near the center of the district unless this works an injustice to the great majority of the children attending. It is desirable to have the building on a main traveled road and nearness to a residence will be a safeguard against depredations. The general attractiveness of the site is important and unless the grounds are provided with shade trees and natural shrubbery, these should be set out at once. Nothing should be allowed, however, to interfere with the lighting of the schoolroom.

In rural districts, there is no excuse for the tiny, cramped schoolgrounds so frequently found as the price of land is not prohibitive and in case of an owner unwilling to sell to the school district, condemnation proceedings may be resorted to. No school ground should contain less than one acre of ground and two acres are much more desirable, permitting plenty of play space and ground for flower and vegetable gardens.

Dimensions.—The schoolroom will be considered the unit. Its height from floor to ceiling should be between 12 and 13 feet, not exceeding the latter figure. The width should not be greater than twice the height, while the length should not exceed 32 feet as the eye strain of those sitting in the rear becomes too great while the voice of the average teacher will not carry easily beyond that distance. A room 23x31 is ideal for thirty pupils and if necessary it will comfortably seat forty-five, which under any circumstances should be the maximum assigned to one teacher. Any greater enrollment works a grave injustice to the teacher and the pupils. In determining the size of the room needed, at least 15 square feet of floor space should be allowed for each child and not less than 200 cubic feet of air space.

Lighting.—The windows should be banked entirely on the left side of the pupils. The building should be placed so that the window space will either face the east or the west, preferably the east as the sun rays purify the room in the morning but after ten o'clock in the forenoon do not enter it. The glass area should equal at least one-fifth of the floor space so in a room 23x31, about 144 square feet of glass area would be needed or 18 running feet of windows 8 feet high. There should be as little space as possible between the separate windows thus doing away with annoying shadows. For a rural school, the bottom of the windows should be four feet from the floor so that no direct rays of light will strike the eyes of the pupil seated at his desk. The windows would then extend well up toward the ceiling which is a distinct advantage as the light from the window space toward the ceiling is much more valuable in lighting the entire room. A steel or iron beam can be used if necessary to give strength to the building when the windows extend so far toward the ceiling.

Interior Arrangement and Finishing.—While various plans will differ on certain points there are a few essentials which may well be insisted upon. Separate cloakrooms should be provided for the boys and girls even when outdoor toilets are used and the doors of the cloakrooms should open into the schoolroom and not the hall in order to insure supervision on the part of the teacher. There should be no teacher's platform. The fuel room should be a part of the building and the door near the heating plant. The floor should be of hardwood and well matched. The woodwork should be of light colored wood and with a natural finish. Blackboards should be installed so that the bottom will not be higher than 26 inches from the floor for the benefit of the little pupils. It is advisable to place the pump indoors if possible.

THE MICHIGAN SCHOOLHOUSE

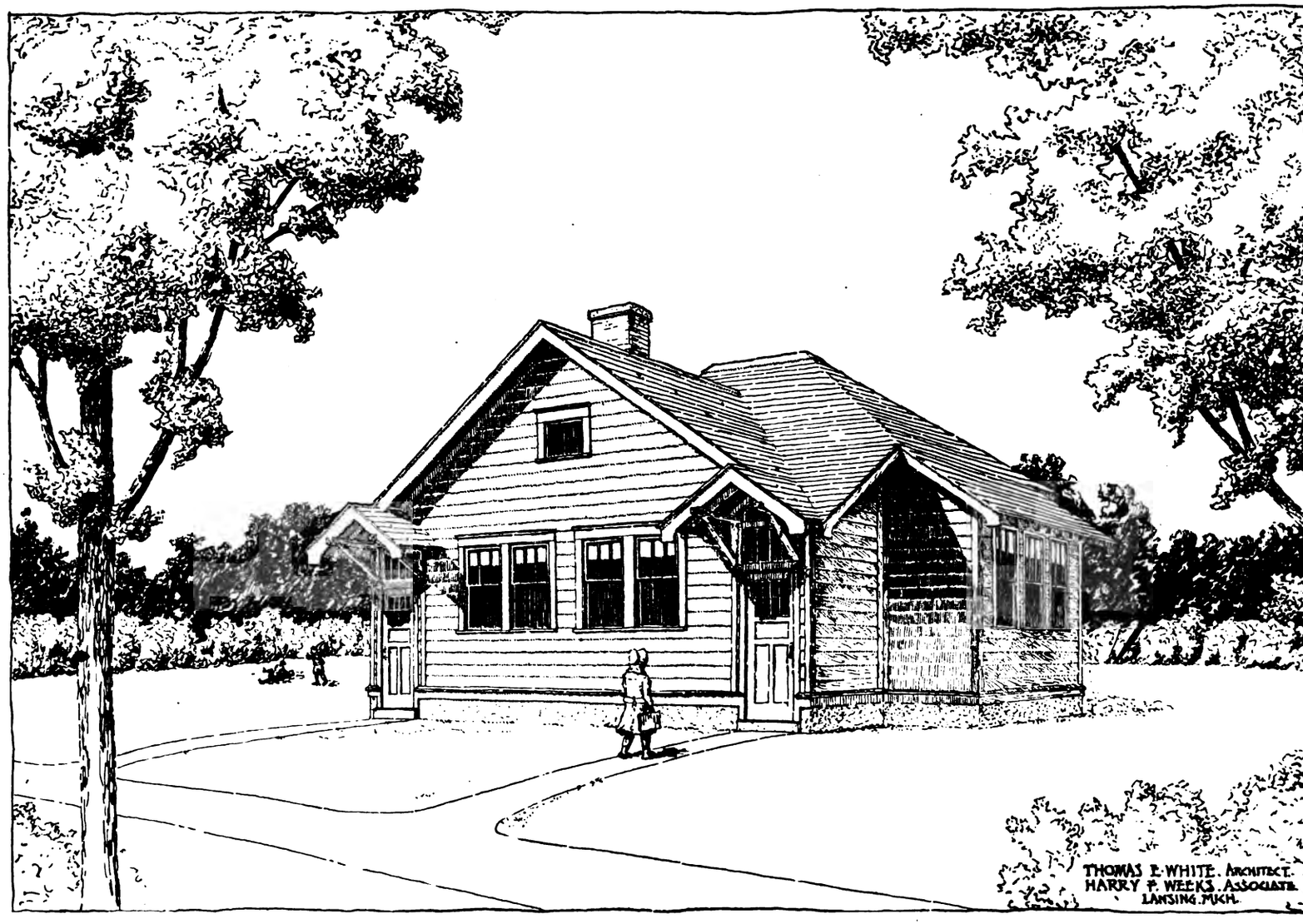
No more serious problems confront members of school boards than those they face after the voters of the district have placed in their
s the power to build. Vastly more important than the biggest barn, the finest church and the most costly residence, the schoolhouse calls
ıe utmost care in planning and every detail should be carefully considered before any contracts for construction are awarded. No building
ly built should be taken as a model unless it is clear that it conforms to the recommendations given in this manual, as regards lighting, heating
ventilation, and the essential features of arrangement described. Realizing that few boards feel that they can afford to employ a com-
t architect to plan the small buildings for them, the Department of Public Instruction determined to offer to the board of the state
ıplete set of plans and specifications which, when followed by a competent contractor will secure the most desirable results. The plans
gular working drawings, the specifications complete, the details carefully made and the bill of materials gives the actual amount and dimen-
of materials required, so that any good contractor can use these and furnish an estimate of cost that will be based upon local conditions
rices.

he Best at Moderate Cost.—It must be remembered in considering the cost of erecting this building, that in it are combined the fuel
and two toilet rooms, which otherwise would have to be built independently and at considerable expense. The fact that the school-
with practically every ideal of proper construction as agreed upon by the leading authorities who have made schoolhouse building a most
ıl study, should carry a great deal of weight. There are no fads about the structure but every feature has been considered on a scien-
asis. The accompanying plans are for a one-room building so planned that it may serve as a model schoolhouse that must be erected and
leted at a moderate cost. This has been considered first.

daptability of the Plan.—Close study of the plan will show that it will serve under all these conditions as a model, and further that with
ery slight modifications will be suitable for use when the building is to have a basement. Also that the same plan is desirable for frame
uction, or when brick is to be used or when hollow tile with a stucco finish is the material. Hollow tile is perhaps the most to be desired
offers several advantages over brick, and the stucco exterior can be made very attractive and artistic in appearance. The high cost
nber makes it advisable to consider most seriously the use of brick or the tile and stucco combination as they have distinct advantages
make them by all means the cheaper in the end though the initial cost is about ten per cent higher. They reduce decidedly the item
ırance, will save money on the fuel bill as they are much easier to heat, and, requiring no paint, demand practically nothing for the
p. Besides the obvious economy of such a building in the long run, it presents a more attractive exterior, suggests the idea of permanence
ıdicates prosperity of the district.

ppearance of the Building.—The architect of the Michigan schoolhouse has solved one of the hardest problems in the construction of a
om building. He has devised a plan that is scientific in arrangement and lighting, yet presents a most pleasing appearance from any
ion, as the front, side and rear elevations are all attractive in appearance. The entire design is suggestive of the purpose for which the
ng is to be used, yet has a home-like touch that is too often lacking. It will harmonize with rural scenery of almost any description. If the
s not particularly large, the building can be placed toward the front of the lot to advantage with the playgrounds in the rear, the most
ble location for them because it takes the children away from the road and gives the teacher a chance to supervise the play from the
room.

rrangement Carefully Considered.—Two outside doors with vestibules in which the steps up to the main floor are placed, furnish access
schoolroom direct. All outside steps are done away with, the steps required being inside and protected from the weather. As there
parate entrances for the boys and girls there will be no congestion. The doors leading into the schoolroom are partially of glass so the
r can watch the entrances preventing hall trouble. The teacher also has direct supervision over the cloakrooms which open from
hoolroom yet are so near the entrances that there is no passing through the room. A toilet room off from each cloakroom is provided,
le for use of the indoor chemical closets or the regular sanitary closet where a water supply and sewage are available. Doors to the cloak-
are open at the top and bottom to provide sufficient heating and ventilation. This location of the toilets is to be the same whether



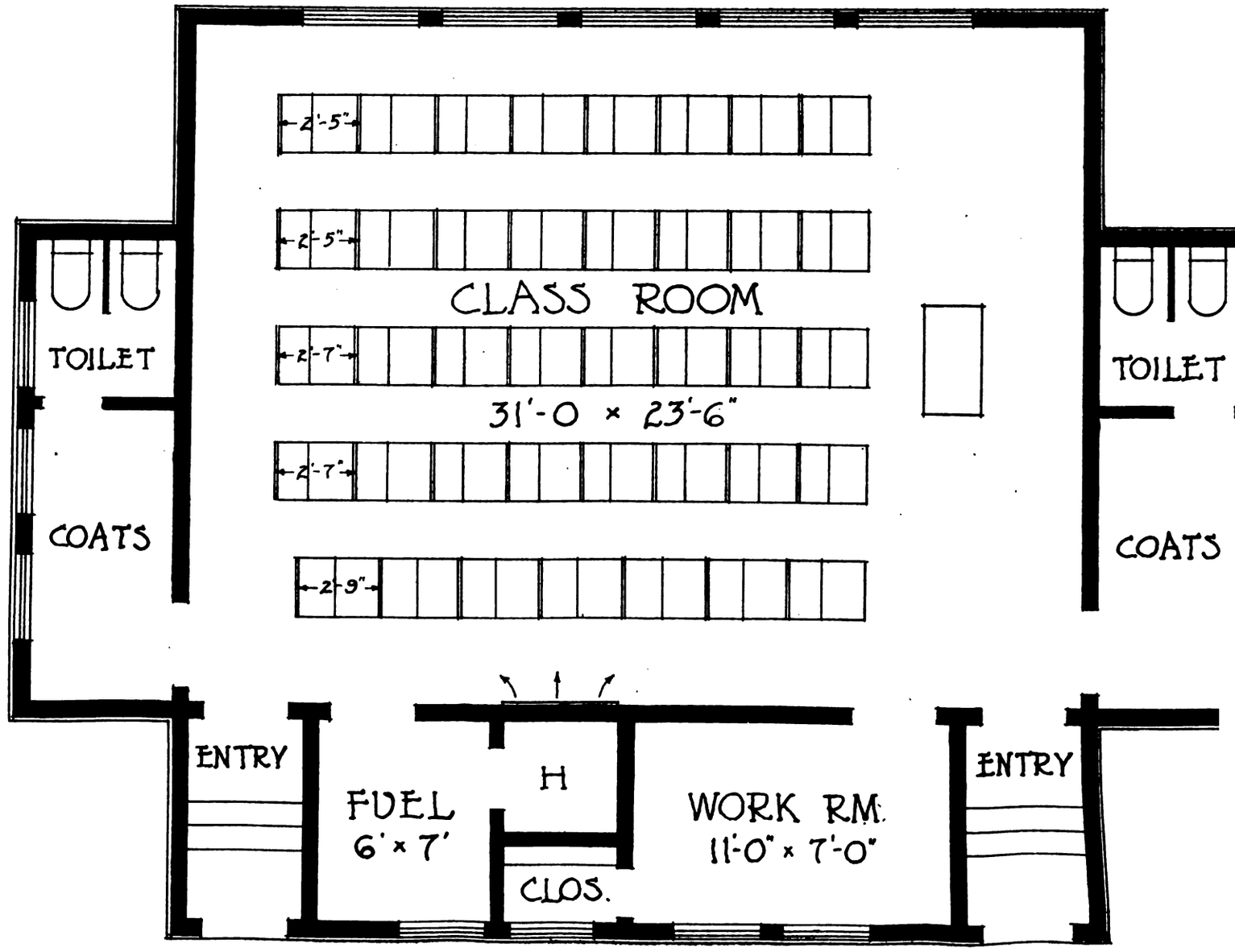
THE MICHIGAN SCHOOLHOUSE

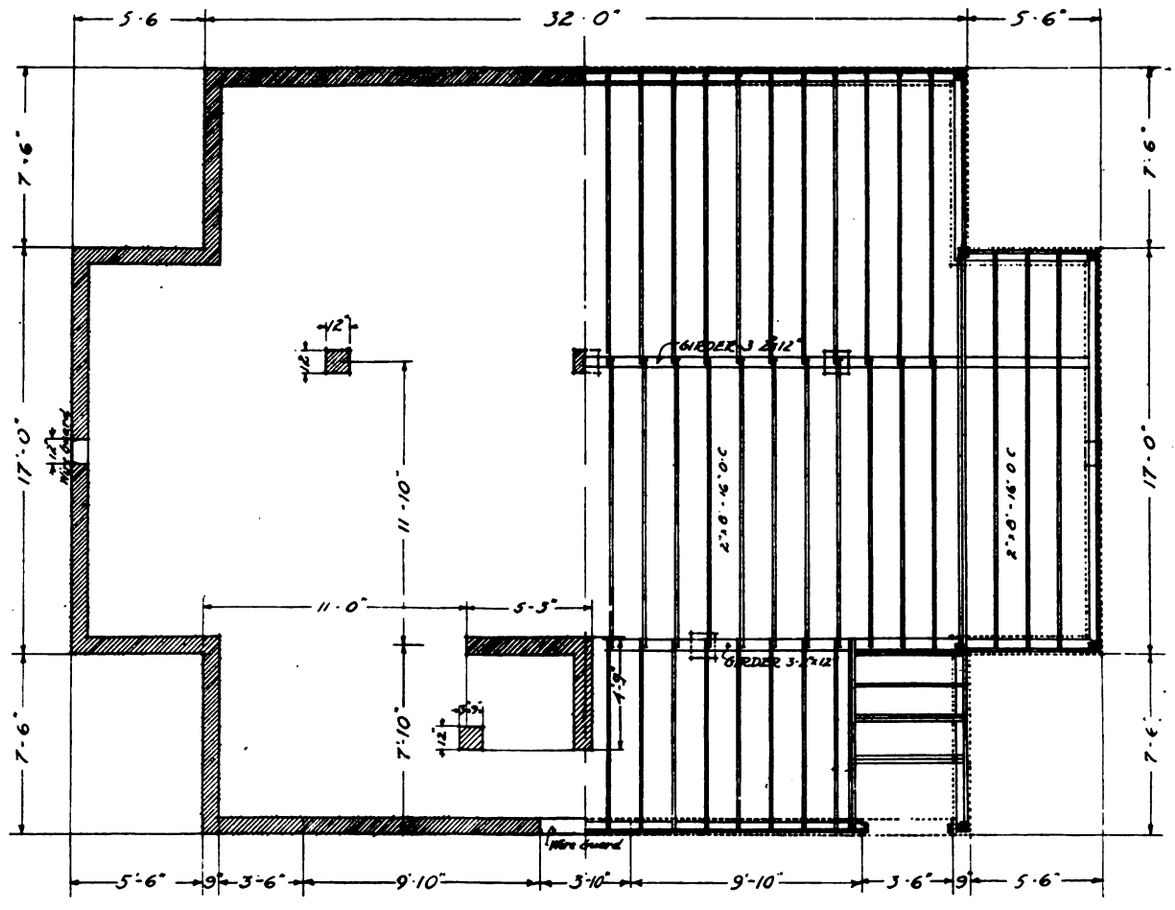
the basement is constructed or not. The workroom is near the teacher's end of the room and as the door between is to be partially of glass, there will be supervision. Pupils can work here without disturbing the remainder of the school in the least, even if the work requires noise. In connection with the workroom is a teacher's closet with a built-in bookcase for supplies. Through the ceiling, a hatchway will open admitting to the attic space, which need not be finished but will be available for future developments. If desired, the teacher's closet may be dispensed with and this space used to make the fuel room larger. The schoolroom plan provides ample blackboard space at the front and right side of the room, the best location possible.

Heating, Ventilating and Lighting.—Experiments have clearly proven that best results in heating and ventilating can be secured with heat and vent registers placed at the side of an inner partition and at the center of the room. This explains the location chosen for the heating room which has good-sized fuel room at one side and workroom on the other, the latter to be warmed when desired by a register leading from the heating room. The heating room plan is particularly good in that all dirt, smoke and dust are kept out of the schoolroom proper. The heat is sent into the schoolroom near the ceiling and the foul air is drawn off near the floor. Any one of the patented heating and ventilating systems can be used or one can be made. The lighting of the room, also, has been given careful attention and it will be seen at a glance that the best arrangement of windows has been secured without detracting in any way from the artistic appearance of the exterior. Every room has good light, yet the plan lends itself to symmetrical elevations and the placing of doors and windows to best advantage for appearance.

Economy of Construction.—The schoolroom is 23 feet 6 inches wide by 31 feet in length, which size is best adapted to the needs of the teacher and pupils and to the most desirable seating arrangement. It will seat thirty children most advantageously and give opportunity for plenty of freedom in floor space, while as many as forty-five may be seated without being too greatly crowded. The width of the room permits the use of 24 foot stock for ceiling joist, and secures thoroughly adequate light from one side of the room. One hundred fifty feet of glass has been provided, thus insuring a glass area equal to more than twenty per cent of the floor space. A thirteen foot ceiling in the schoolroom with nine foot ceilings in other parts of the building economize in building material while securing proper cubic contents of the schoolroom for each occupant.

What the Building Will Cost.—While the cost of erecting the Michigan schoolhouse will vary somewhat in various districts depending upon the availability of materials and the labor supply, an effort has been made to find out what will be an average cost. The plans, specifications and bill of materials which follow were placed in the hands of contractors in various parts of the state and they stated the amount for which they would be willing to erect the building. Their figures varied but a fair average of their estimates is $2,000.00. The cost of putting in a basement which would provide space for fuel and playrooms would be about $200.00 additional.


2'-5"
2'-5"
CLASS ROOM
2'-7"
31'-0 × 23'-6"
2'-7"
2'-9"
TOILET
COATS
TOILET
COATS
ENTRY
FUEL
6' × 7'
H
CLOS.
WORK RM.
11'-0" × 7'-0"
ENTRY

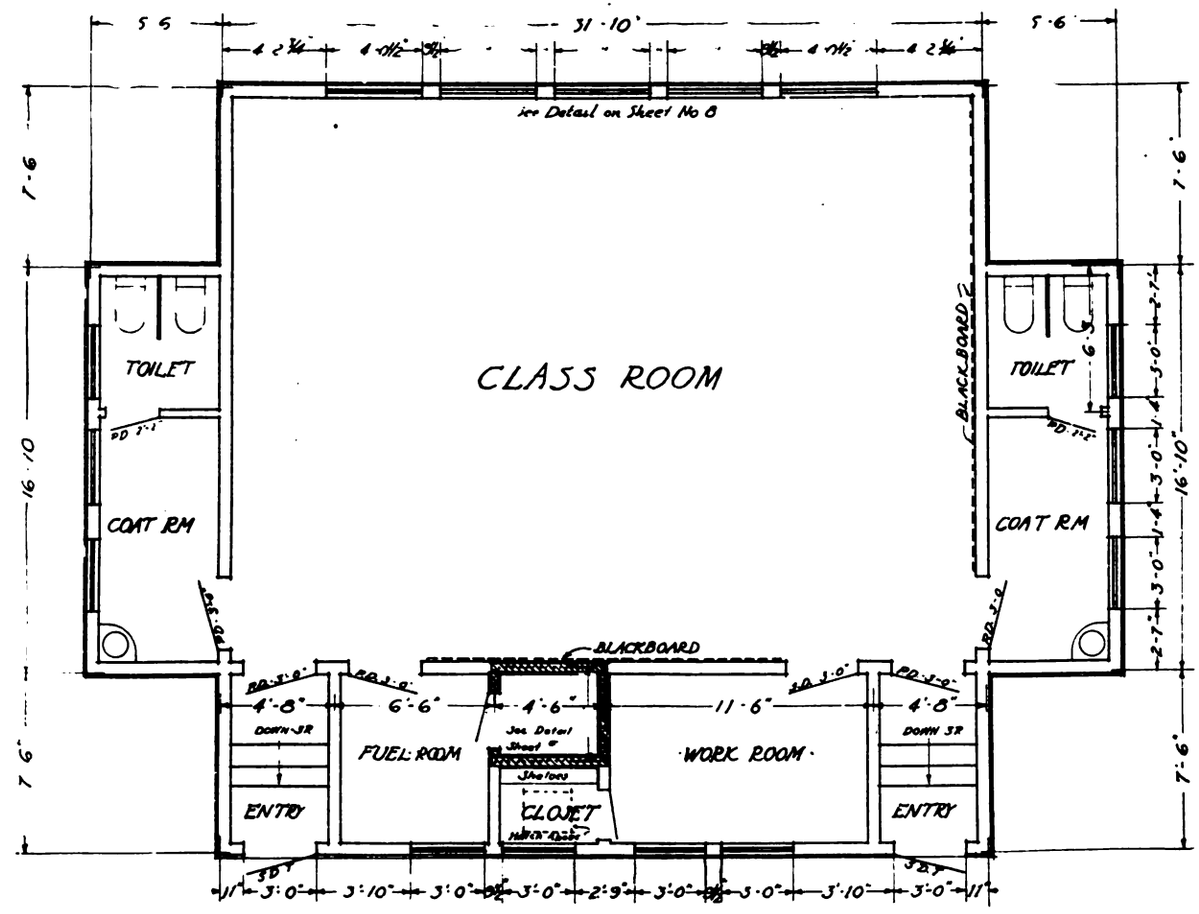


· FOUNDATION · AND · FRAMING · PLAN ·

Scale ¼" = 1'-0"

THOMAS E WHITE ARCHITECT
HARRY F WEEKS ASSOCIATE
LANSING MICH

SHEET 1 OF



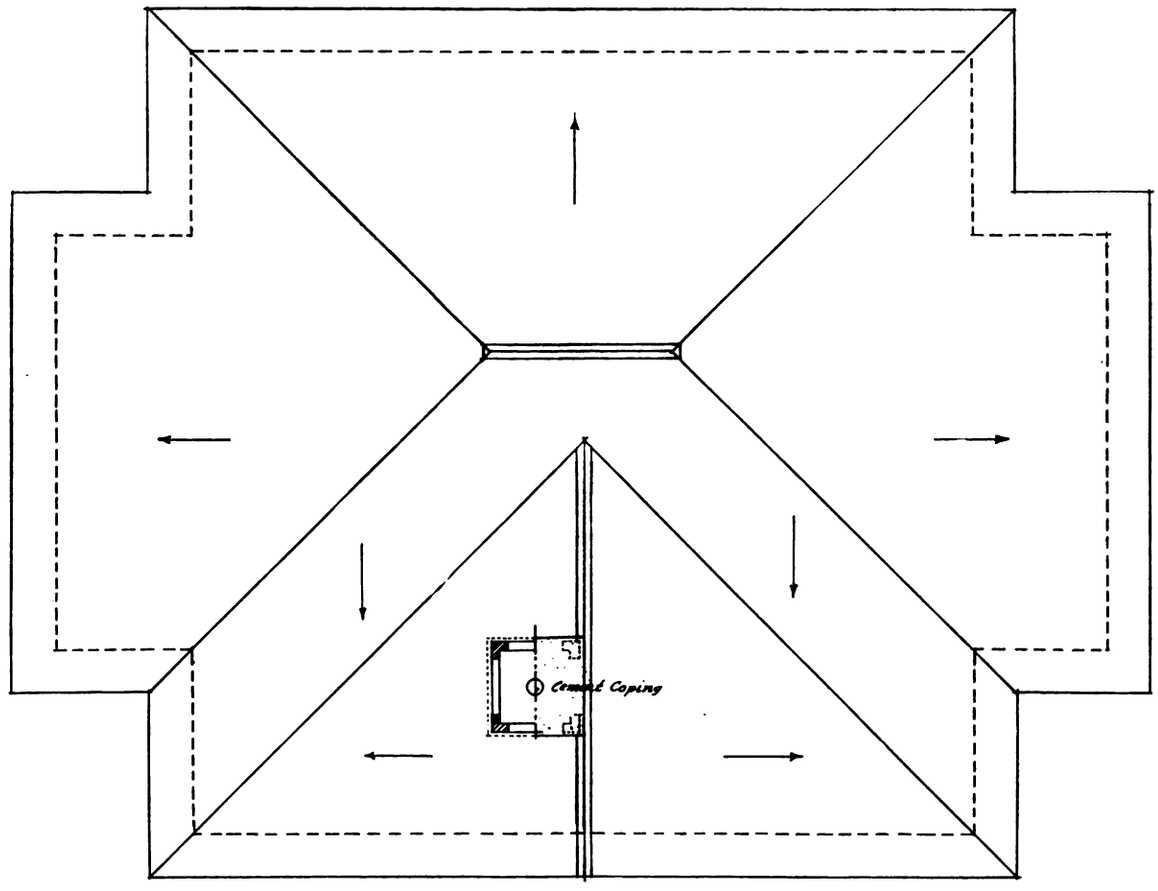
FLOOR PLAN

SCALE ¼" = 1'-0"

Dimensions given on this plan are to outside of studs for outside walls, to center lines of partitions, and to pulley stiles of windows.
All inside doors to be 7'-0" high.

THOMAS E. WHITE ARCHITECT
HARRY F. WEEKS ASSOCIATE
LANSING MICHIGAN

SHEET 2

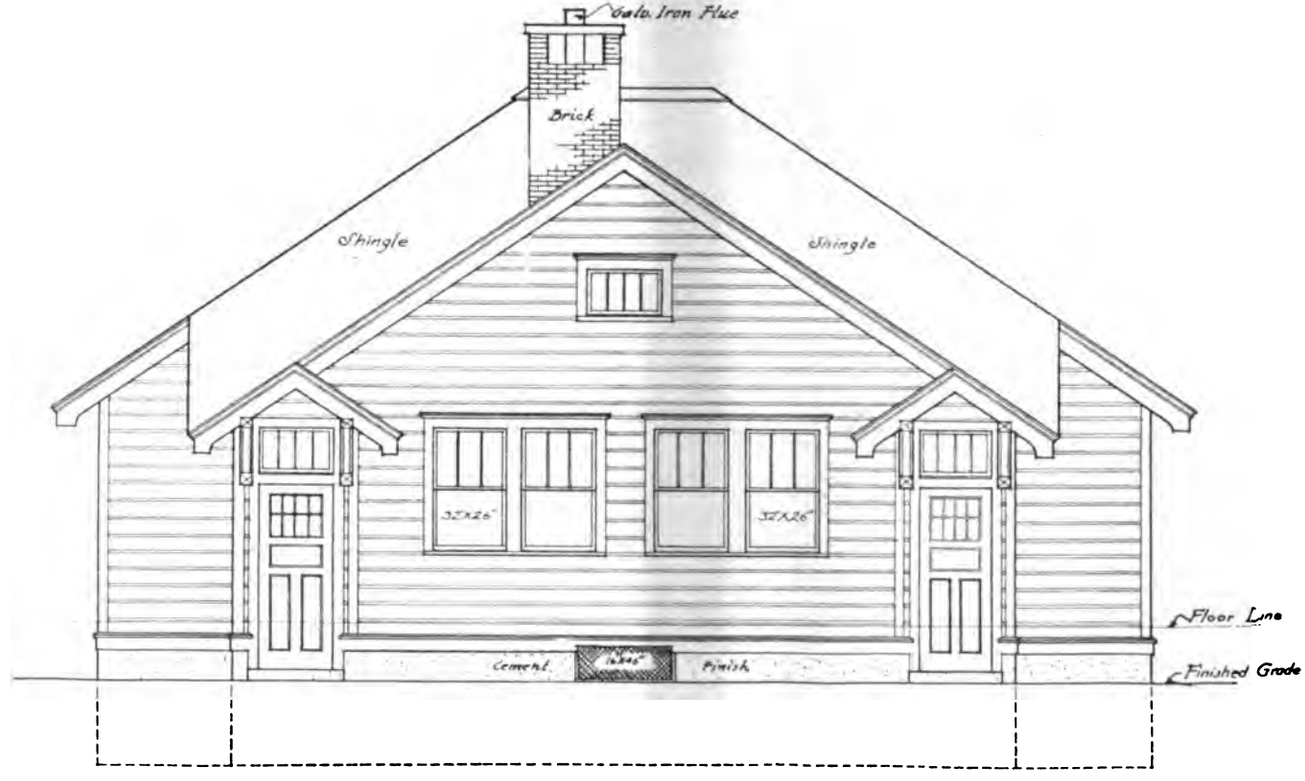


· ROOF · PLAN ·

Scale ¼"=1'-0"

THOMAS E. WHITE ARCHITECT
HARRY F. WEEKS ASSOCIATE
LANSING MICH

SHEET 3 OF 7

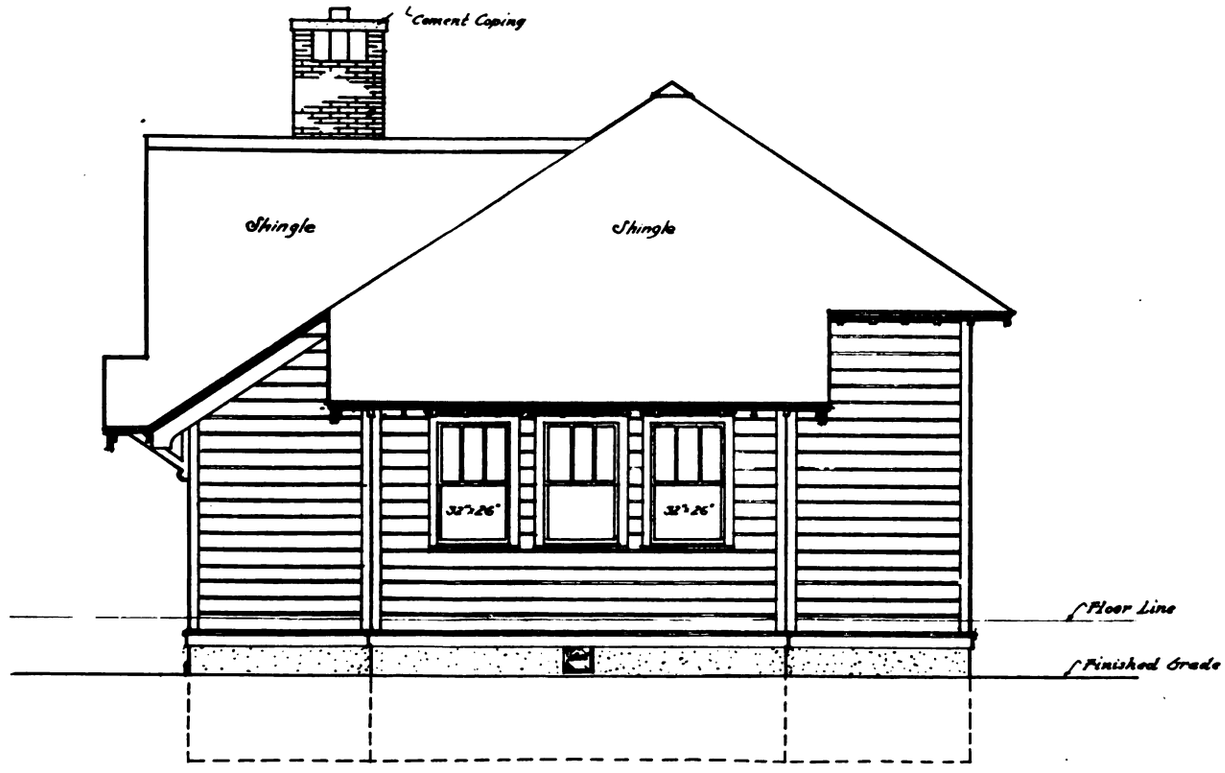


FRONT ELEVATION

Scale 1/4"=1'-0"

THOMAS E WHITE. ARCHITECT.
HARRY F. WEEKS ASSOCIATE
LANSING MICH

SHEET 4 SET

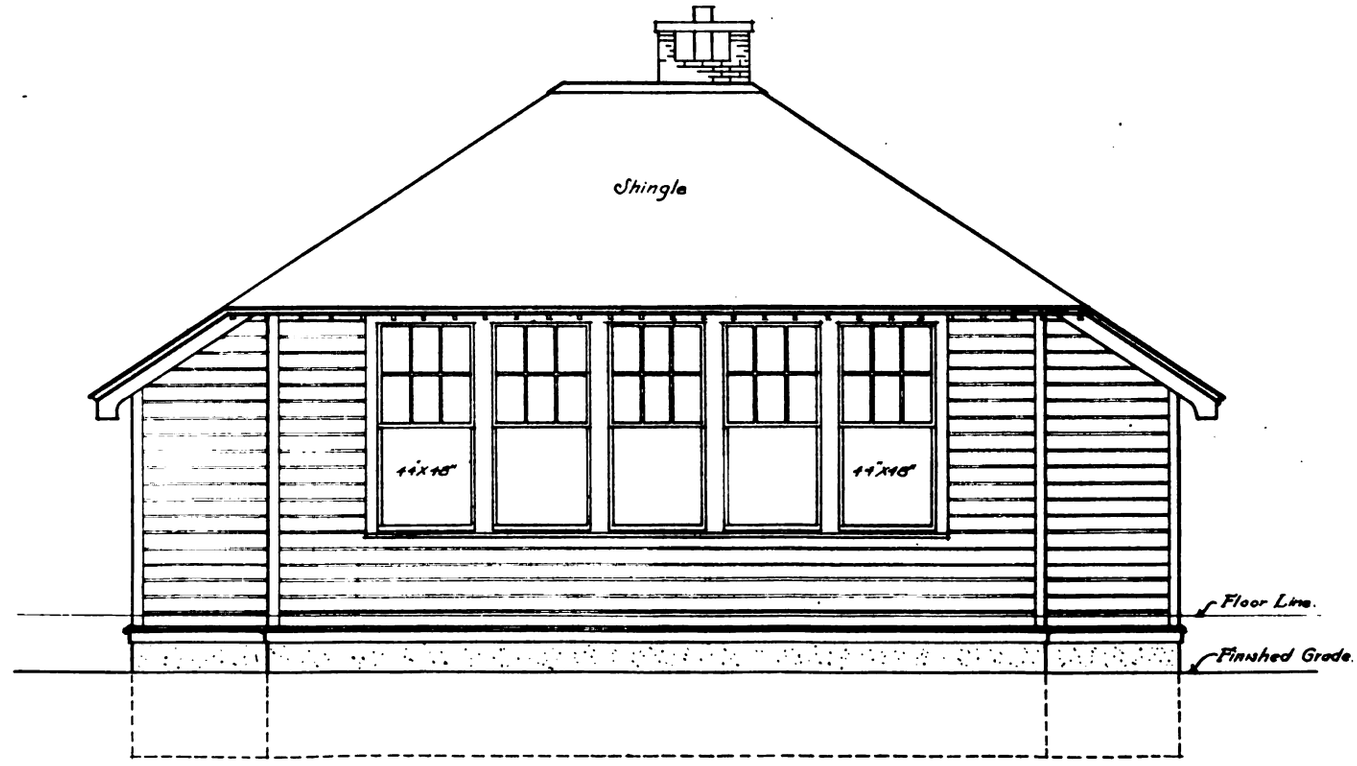


SIDE ELEVATION

Scale ¼"=1'-0"

THOMAS E WHITE ARCHITECT
HARRY F WEEKS ASSOCIATE
LANSING MICH.

SHEET 5

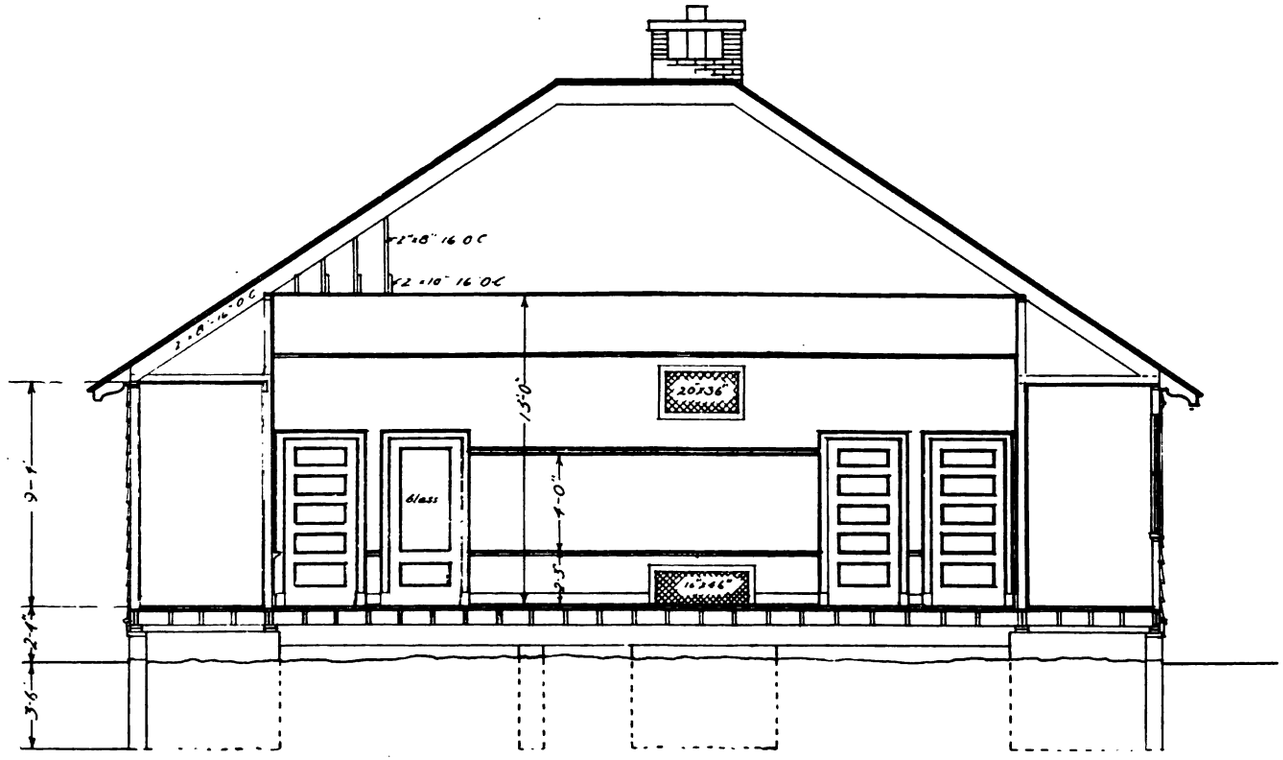


REAR ELEVATION

Scale 1/4" = 1'-0"

THOMAS E. WHITE ARCHITECT
HARRY F. WEERS ASSOCIATE
LANSING MICH

SHEET 6

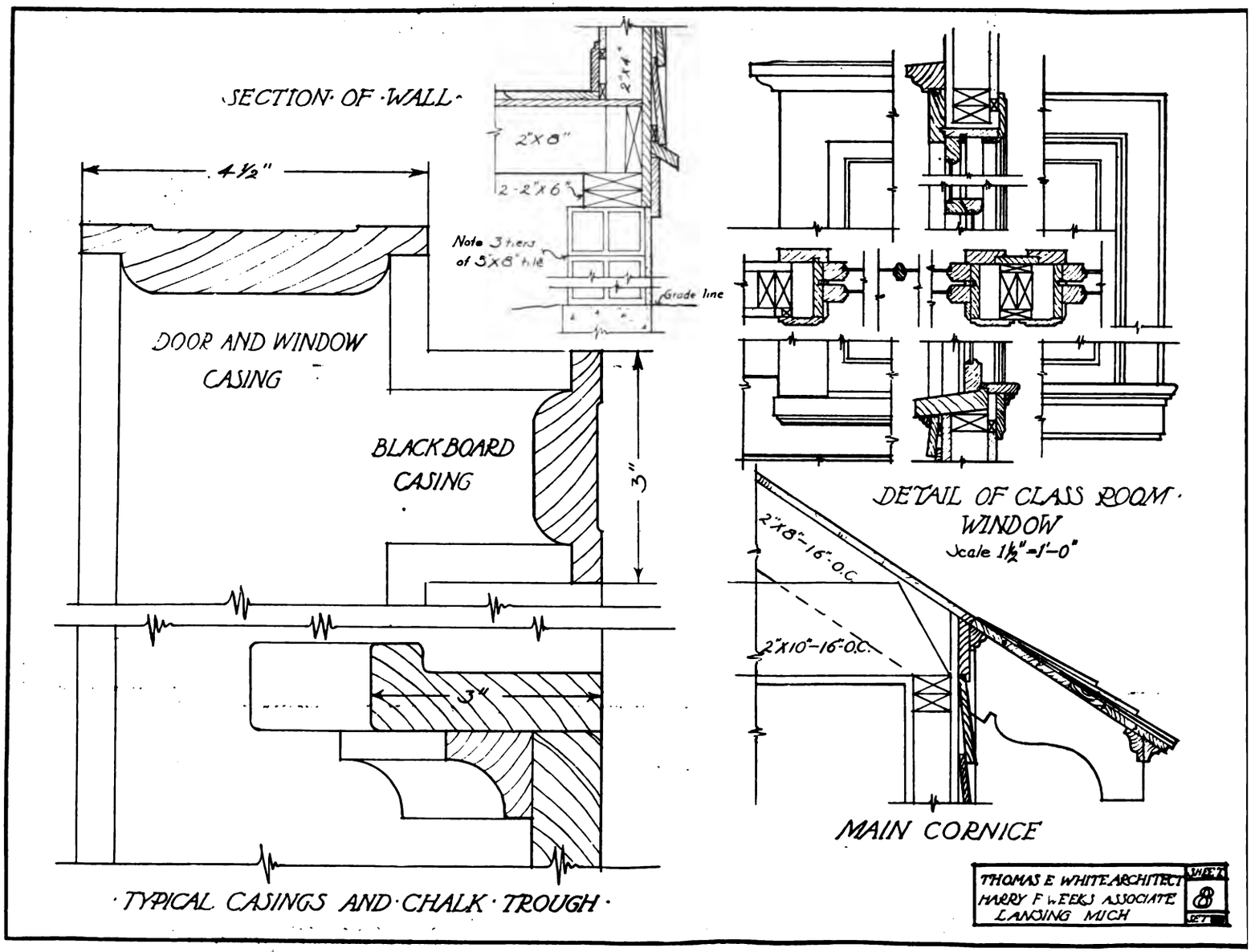


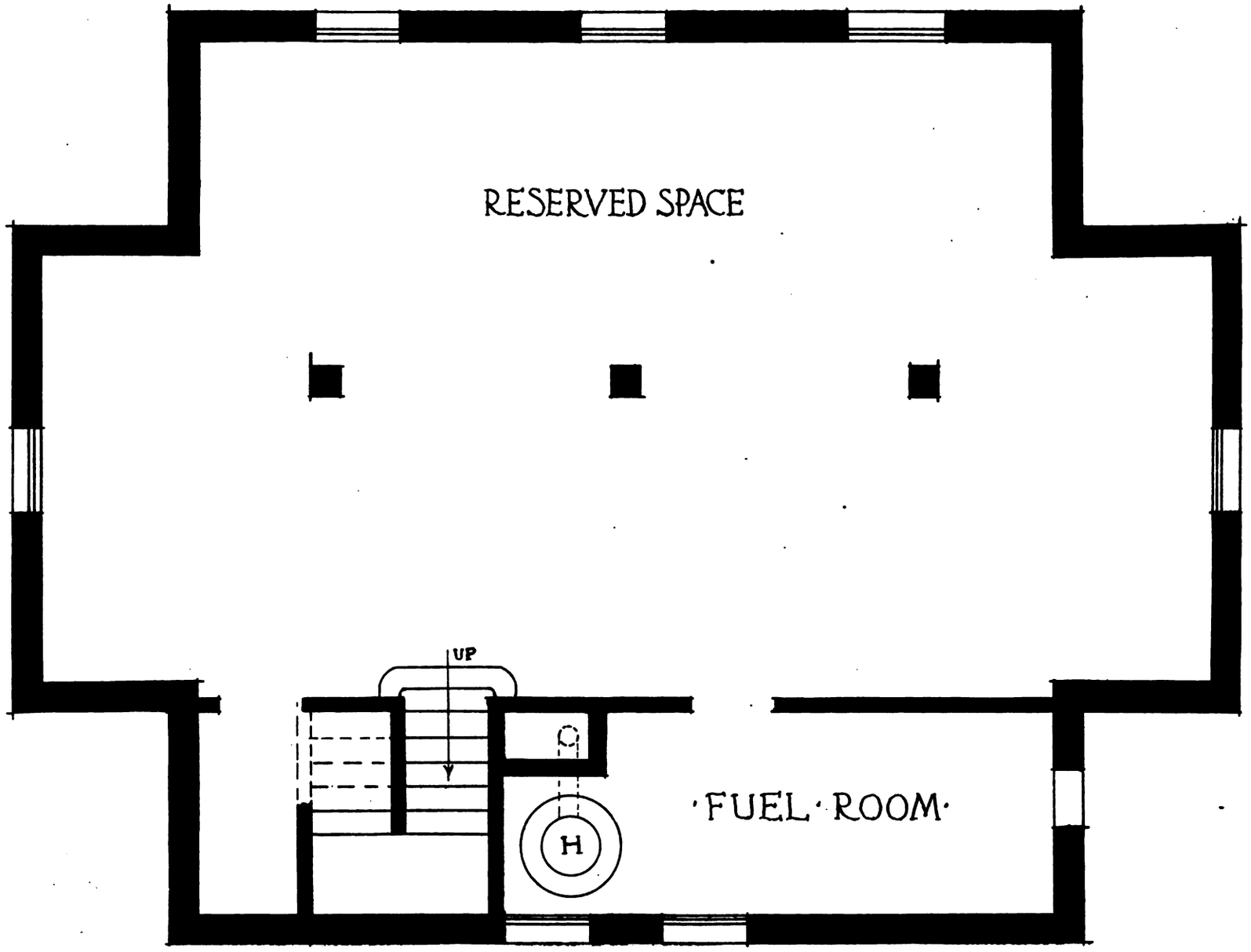
SECTION

Scale ¼"=1-0"

THOMAS E WHITE ARCHITECT
HARRY F WEEKS ASSOCIATE
LANSING MICH

SHEET 7 SET


SECTION OF WALL
4½"
2"X8"
2-2"X6"
2"X4"
Note 3 tiers of 3"X8" tile
Grade line
DOOR AND WINDOW CASING
BLACKBOARD CASING
3"
3"
TYPICAL CASINGS AND CHALK TROUGH
DETAIL OF CLASS ROOM WINDOW
Scale 1½"=1'-0"
2"X8"-16" O.C.
2"X10"-16" O.C.
MAIN CORNICE
THOMAS E WHITE ARCHITECT
HARRY F WEEKS ASSOCIATE
LANSING MICH
SHEET
8
SET


RESERVED SPACE
UP
FUEL · ROOM ·
H

SPECIFICATIONS AND BILL OF MATERIAL FOR THE MICHIGAN SCHOOLHOUSE

BY THOMAS E. WHITE, ARCHITECT, AND HARRY F. WEEKS, ASSOCIATE

Excavation.—Trenches for foundation walls to be excavated the size indicated for foundation walls. The building should be carefully located on the site and staked out carefully to dimensions shown on foundation plan. Excavate for piers as shown and all foundation excavations to be carried down 3′-6″ below finished grade or frost line. If the soil be loose or sandy the excavation to be made larger so that sides may be stayed with boards which will be placed and nailed to uprights so as to provide forms for concrete foundation as shown. With firm earth the trenches can be dug and filled at once with concrete.

Cement Concrete.—Cement concrete should be mixed by machinery or by hand and when by hand, in mortar box. Concrete to consist of six parts of clean coarse gravel to one part of cement by measure and one part of clean sharp sand, mixed dry, water added in sufficient quantity to wet all materials and concrete to be at once dumped into trenches and to be well tamped into place. Foundations to be brought up to proper heights and leveled off with cement mortar, one to four, in which the plates and girders are to be bedded.

Iron Work.—Metal frames for fresh air intakes and for foundation vents to be placed where shown and to be bedded and pointed up in cement mortar. The fresh air intake to be of approved pattern with coarse wire screen on outside and with wing shutters opening in, which can be operated from the teacher's closet above. Fresh air duct to be properly connected with intake register with joints soldered and made air tight. The fresh air duct to be carefully formed of No. 20 best bloom galvanized iron with riveted and soldered joints and with ribs to stiffen and hold in form, and to be carried on metal bars supported by chain hangers attached to floor joist. All iron and metal work directly connected to heating system to be furnished by heating and ventilating contractor but the general contractor is to frame for and assist the heating contractor in placing same and making connections.

Provide and build in foundation wall eight ½″ bolts 16″ long for anchoring plates.

Provide and properly place all rough hardware, nails, screws, bolt, etc., required for proper construction and completion of the building shown and specified. Door and window trim under another heading.

Tile.—Provide and erect all the hollow tile for foundation walls, for vent stack and for interior partitions indicated using standard forms, good hard burned tile, regular in shape, with deeply scored faces for plaster or stucco finish inside or outside.

Use 8″ x 12″ x 12″ and 8″ x 12″ x 4″ four hole hollow tile set with holes vertical for exterior angles of foundations and build the rest of the foundation walls of 5″ x 8″ x 12″ Jumbo blocks or backup tile laid with holes horizontal. All tile to be laid in cement mortar, or good lime mortar gauged with cement, fully bedded and all joints slushed full. All laid to a line, plumb, square and true, and all interior partition tile to be laid with holes vertical and bonded at the corners and as shown and detailed. Openings in tile partitions to have cement lintels of proper height to fit with next tile course and for long spans to be reenforced with steel.

Cap of Stack.—Vent stack to be topped out above roof line as shown using a good hard burned red brick laid in cement gauged mortar with trowel pointed joints and as shown. Openings each side at top and the whole stack capped with a stone or cement cap 5″ in thickness with 8″ hole in center for smoke pipe. Openings to be fitted with louver boards and wire screens.

Framing Materials.—Use full dimension stock for built up girders, floor joist, ceiling joist and rafters and all of spruce or Norway pine. Other framing to be of hemlock and stock sizes and all to be first quality.

Girders.—To be built up of spruce to 6″ x 12″ and continuous as shown, placed level and true and spiked to plates.

Wall Plates.—To be built up of two 2″ x 6″ spruce with laps at corners and well spiked together and to girders. To be bedded and leveled and left ready for studs and joist bearings.

Floor Joist.—To be 2″ x 8″ in size of spruce and placed 16″ on centers. To have good bearings on plates and girders and to be spiked to each bearing and to each other where they lap.

Studding.—To be first quality hemlock or spruce, to be set plumb, square and true on plates or girders, doubled at all openings and built up solid or as detailed at corners and intersections, cut to fit skirting joist and set 16″ on centers. To be properly framed for all openings with headers and sills of proper dimension for span. Studs in gables to be carried up to roof line and all studs to be well nailed to bearings and other framing where they meet.

Wall Plates.—Plates to be 2″ x 4″ doubled and lapped at corners and to be well spiked to all studs, and together.

Ribbons.—To be 1″ x 5″ and let in for ceiling joist bearings in gable walls and to be well nailed to every stud.

Roof Framing.—Frame for the roof as shown with gable at front and with hips, valleys, ridges all as shown of pitch indicated and framed together in the best manner. Ridges, hips and valleys to be 10″ deep and valley rafters to be built up double and to be supported by partition below. Use spruce for rafters, placed 20″ and 24″ on centers, all spans of 14′ or over to be placed 20″ on centers and all to be cut to proper length to proper miter and to be fitted and spiked together in the best manner. The four pair of long span rafters at front of front gable roof to each have a collar beam placed and securely spiked at each end. Lookouts to be placed as shown and detailed and well nailed to rafters and plates. Bargeboards and other roof parts as shown and detailed, and all put together in the best manner and securely nailed.

Floor Joist Covering.—Floor joist to be covered with hemlock sheathing laid diagonally and well nailed to every bearing. All end joints to be made over a bearing. Frame for entrance platforms as shown and with steps. Frame for opening for fresh air box as shown and detailed.

Fuel Room Lining.—To be of cement over metal lath on studs and with sheathing cut in between studs and floor joist 2″ from edge and concrete to finish 1″ above studs and joist.

Roof Boards.—All rafters to be covered with 1″ x 4″ hemlock sheathing boards dressed one side and laid level and true 1½″ apart with all joints over a bearing and each board nailed to every bearing with two nails each. Use matched and beaded boards for overhangs with bargeboards, and finish as shown and detailed and all securely nailed in place.

Shingles.—All roof surfaces to be covered with the best grade 16″ Washington cedar shingles laid true to a line 5″ to the weather and each shingle nailed with not less than two nails each. Valleys to be lined 7″ each side of open gutters with Scotts extra coated 1C tin painted under side before being placed. Ridges to be finished with best bloom galvanized iron ridge rolls shaped and finished as shown and placed and secured in the best manner. Flash and counter flash around the stack using tin as above specified, with counter flashing stepped on the rakes and upper edge let into the brick work, vertical joints soldered and lower edge to come within 2″ of the roof line. All metal work to be painted a good coat of red lead, before being placed, for the under side and two coats on upper side after being placed.

Door Frames.—Frame for doors as shown and all frames to be as shown and detailed. Outside frames to be rabbeted for doors to swing out and to have transom bars and transom sash as shown. Frames to be set plumb, square and true and for doors of sizes indicated. Inside frames to be plowed for stops to be nailed in for doors to swing as indicated and of sizes shown. To be of cypress outside.

Window Frames.—Window frames as shown and detailed, full box frames for double run sash. Frames to be of clear white pine framed and put together in the best manner and according to details. Stiles to have long face pulley stiles and weights to accurately balance the sash after glazing. Outside casings to be as shown and of cypress. Inside casings and finish to conform to interior finish.

Sash.—All sash to be of clear well seasoned and kiln dried white pine stock, with O. G. molding, morticed, tennoned and glued together, with beveled meeting rails and all of sizes shown. Sash to be primed before being brought to the building and are to be glazed in the best manner using plenty of tacks and the best of putty. Glass to be D. S. A. A. All sash to be back puttied before glazing and all glass to be cleaned off and left whole and in perfect condition at completion of the building. Transom sash and glazed doors to have elastic cement or rubber backing and wooden stops.

Doors.—All doors of sizes shown and glazed or stock panelled doors as indicated. Outside doors to be solid cypress and inside doors to have solid panels with veneered styles and rails and all to be strictly first quality, built up in the best manner, tongued, grooved, pinned and glued together. Cypress stock to be thoroughly seasoned and all other materials to be kiln dried in addition.

Finished flooring.—To be clear maple stock, $2\frac{1}{2}''$ face, to be buffeted, bored, end matched and hollow backed and to be securely blind nailed after having been well strained into place.

Lathing and Plastering.—All walls and ceilings except those otherwise indicated are to be lathed and plastered.

Grounds.—Are to be placed for all finish and $\frac{3}{4}''$ thick and to be securely nailed to every bearing and to be placed so as to form plumb, level and true lines for face of plaster.

Lath.—To be first quality hemlock or spruce and to be well wet before being placed. Use 4′ lath, placing same with $\frac{1}{4}''$ spacing on ceilings and 5-16″ spacing on walls and all lath to be placed level and true with joints broken every seventh lath and nailed with two nails to every bearing. No lath to run thru behind intersecting partitions. Use metal lath over openings in brick or tile work that is to be plastered.

Sand.—Clean sharp sand to be used and to be well screened and to be coarse grained.

Lime.—Fresh burned rock lime to be used, to be thoroughly slaked before using, and the lime used for finishing coat to be strained and kept free from all discoloring substances.

Hair.—Cattle or goat hair to be used and to be freely separated before use, by beating or soaking.

Base Coat.—To consist of mortar composed of one barrel of pure lime putty, three parts sand, and $\frac{1}{2}$ bushel hair. The mortar to be stacked at least 3 days before using.

Brown Coat.—To consist of 1 barrel lime putty, 6 barrels sand and $\frac{1}{4}$ bushel of hair. This morter to be stacked at least 10 days before using.

Finishing Coat.—To consist of two parts lime putty to one part washed sand, and to be gauged with plaster of paris just before using.

Preparation.—Examine all walls and ceilings and see that lath are securely nailed and all grounds properly placed for securing all interior finish before placing base coat.

Application.—Base coat to be carried to the floor on all walls and under all inside finish. To be applied working well into lathing so as to secure a good clinch. If applied in hot weather the lath are to be wetted first. Before base coat dries its face to be thoroughly scratched and the Brown coat applied at once. This coat to be worked so that all surfaces will be true, all walls plumb and true, all angles square and true to vertical or horizontal lines. The Brown coat must be well worked into the scratch coat and must be thoroughly dry before the finishing coat is applied. Finishing coat to be gauged with plaster of paris in such quantities as can be used at once and no mortar thus gauged and allowed to stand to be used. This coat to be applied carefully and to be given a water float finish so that all surfaces will be free from laps or clouds and be left in perfect condition.

All tile, brick or cement surfaces on which plastering is applied to be free from loose materials and to be well dampened before plastering is applied.

Finishing coat will be omitted under blackboard and wainscotting covered surfaces, and in the heating and fuel rooms the finishing coat will be cement mortar applied as above and trowelled to a smooth and even surface.

Do all patching that may be required to leave work in first class shape in every particular.

INTERIOR FINISH

Lumber.—All interior wood finish to be selected for the various parts and of clear oak or yellow pine throughout. All finish to be thoroughly seasoned and kiln dried, and it is to be molded, shaped and put together as shown and detailed. See detail sheets for finish and plans for amount to be placed.

Casings.—Around all openings for doors and windows and as shown and detailed. Special backband or narrow casings around blackboards, etc., with chalk rail at bottom and wainscoting cap or chair rail at top of burlap wainscoting in main room. Strips for coat hooks in coat rooms and picture molding in main room and work room. All as shown and detailed.

Wainscoting.—In main room a wainscoting is to be placed. The walls to receive a good glue sizing over which the sanitary burlap is to be attached with the chair rail or cap at top and the baseboard at bottom. This material to extend under all casings and other finish it comes in contact with.

Blackboards.—Place first quality slate blackboards at front end and right side of room as shown on plans. Boards to be bedded in cement mortar and have square and true end joints which are to be pointed up with putty mortar colored to match color of slate. Screws to be used to fasten boards. Casings and chalk rails to be carefully placed so as to have tight joints next to boards.

Closet.—Teacher's closet opening off of work room to be equipped with rail for coat hooks, and to have book shelves built in as shown and detailed. A well hole with scuttle cover to be placed in ceiling of closet to admit to attic space.

Hardware Trim.—Outside front doors to be right and left hand doors 7′-6″ high by 3′-0″ wide and 2¼″ thick to be hung on three extra heavy wrought steel butts each 6″ x 6″. To be equipped with Russwin or other approved panic exit bolts including knob with cylinder lock for outside and escutchion plate.

Two doors opening between class room and vestibules to be hung on three 5″ x 5″ extra heavy wrought steel butts and to be equipped with exit bolts with side latching action and knob for outside of door.

Other doors throughout the building to be hung on two butts each and to have Morticed locks, escutchion plates each side with knobs and face plates. All 3′ doors to have 5″ x 5″ butts and smaller doors 4″ x 4″ butts.

All double run sash to be equipped with locks, lifts and upper sash with pulls.

Toilet Rooms.—Partitions to be of matched and beaded lumber finished both sides and provision made for the installation of sanitary closets of approved type.

Drinking Fountain.—Each cloak room to be equipped with a sanitary drinking fountain of approved type.

Heating and Ventilating.—Equipment to consist of fresh air intake 16″ x 46″ built in foundation wall and connected to fresh air chamber under the heater by a galvanized iron duct with same capacity. Intake to have shutter damper so that air supply can be cut off and to be covered with heavy wire screen. Where intake duct meets air chamber another damper to be placed. Both of these dampers to be controlled by chains leading to closet off work room. The edge of air chamber nearest the vent register to have three hinged dampers each with control chain placed as directed. These dampers permit the recirculation of the air from the schoolroom thru the warm air chamber when open. The upper end of air chamber is open to warm air space around the heater and is connected at the top to the heat register. The heat register to be 20″ x 36″ in size, with winged damper that will permit closing off flow of air. The vent register to be 16″ x 46″ in size with same dampers and is to be located at the floor line. Each register to have large air space, 90% of full size. Vent register to be connected to air space around the heater jacket which is to open to stack. Heater to be of approved pattern and ample capacity with large combustion chamber and one presenting a large heating surface. To be set on steel angles on top of air chamber. The heating chamber to have tile walls finished with cement plaster and to continue up for stack as shown. The stack above roof to have brick finish as shown. The smoke pipe from heater to continue up in center of stack and all as shown and detailed.

PAINTING

Preparing.—The general contractor shall leave the building broom clean and ready for the painter. The painter is referred to the plans and specifications as to amount to be finished. The painter shall notify the carpenter of all finish he finds that is not smoothly sand papered and in condition for priming.

Priming.—All sash to be primed before being brought to the building. All outside finish to be primed as soon as placed. Any inside finish placed before the plastering is to be primed before the plastering is begun. Priming of all metal work to be red lead and oil. All woodwork that is to be painted to be primed with white lead and oil. All woodwork that is to have natural finish to be filled or primed with clear oil. All open grained wood to be filled; and the cypress to be stained with acid stain of approved kind or an oil stain which would be followed with a coat of boiled linseed oil well rubbed in.

Putty.—The painter shall thoroughly putty-stop all work, exterior and interior, after the first coat and before the last coat with putty properly colored to match the finish.

Paints.—Strictly pure white lead and linseed oil shall form the basis of all paints, unless otherwise specified. Paints to be of colors and tints selected as follows: Outside walls dark brown acid stain with casings, etc., white. Doors natural finish. Inside woodwork in rooms facing the south to have woodwork painted, a soft pear gray for the walls and white for woodwork. Rooms facing the north a light tan for walls with woodwork cream color, and ceilings to be cream colored wherever finished. Hardwood finish stained dark for high light exposure and light or natural finish for north exposure.

Varnishes.—Varnishes of standard quality should be used throughout, such as Pratt & Lambert's, Berry Brothers' and not be thinned down or otherwise adulterated and be applied according to manufacturer's specifications.

Application.—Paints and varnishes to be applied by skilled workmen, paint to be flowed on smoothly and well rubbed in, and all surfaces evenly coated. Rubbing must be thorough and is not to be done until coat rubbed is well dry. Hardwood finish to receive two coats varnish after filler and to be lightly sanded between coats. The maple floor to receive a good coat of linseed oil applied hot and well rubbed in. Painted work to receive three coats.

In General.—After painter begins finishing he shall properly protect the building and his and others work. He shall be responsible for the building and shall repair and make good all damage to same and shall leave his work clean and in perfect repair. All paint and varnish spots to be removed from walls, glass, floors, etc., and at completion he shall turn over the building complete and in good repair so far as his work is concerned and as concerns damages caused during his occupancy.

SCHEDULE OF LABOR AND MATERIALS

Excavation.—

For piers,
five each 1′ x 1′ x 3′-6″ 17.5
trenches 152′ x 1′ x 3′-6″ 532

549.5 of 21 cubic yards.

Cement concrete for walls and piers as above, 21 cubic yards.

Foundations above grade.—

Hollow tile—eight pieces 8″ x 12″ x 12″
eight pieces 8″ x 12″ x 4″
450 pieces 5″ x 8″ x 12″
Two 12″ x 12″ screened vents built in walls.
Outside finish, stucco—200 square feet.

Mason work for heating and ventilation.—

Cement Concrete foundations and lintels 2 cubic yards.
Hollow tile—320 pieces 4″ x 12″ x 12″. 650 brick.
Stone.—1 piece 4″ thick and 4′-0″ x 4′-0″ with 8″ hole in center.

Iron work built in for heating and ventilation.—

One fresh air intake 16″ high x 46″ long built in foundation wall.
One heat register 20″ high x 36″ long built in partition.
One vent register 16″ high x 46″ long built in partition.

Woodwork.—

Girders, built up spruce 6″ x 12″ x 75′
Wall plates, spruce 2″ x 6″ x 320′
Joist, spruce, 52 pieces 2″ x 8″ x 12′
30 pieces 2″ x 8″ x 8′
10 pieces 2″ x 8″ x 18′
4 pieces 2″ x 8″ x 16′
Cross bridging, 96 pieces $1\frac{3}{4}$″ x $1\frac{3}{4}$″ x 16′
Floor lining, 1200′ $\frac{7}{8}$″ sheathing dressed one side.
Studs, hemlock or spruce, 90 pieces 2″ x 4″ x 14′
50 pieces 2″ x 4″ x 10′
12 pieces 2″ x 4″ x 12′
8 pieces 2″ x 4″ x 14′
36 pieces 2″ x 4″ x 10′
Wall plates, 20 pieces 2″ x 4″ x 16′
4 pieces 2″ x 4″ x 16′
Ribbons, 2 pieces 1″ x 5″ x 18′
Ceiling joist, spruce, 25 pieces 2″ x 10″ x 24′
13 pieces 2″ x 4″ x 12′
13 pieces 2″ x 4″ x 16′
Ridges, one piece 2″ x 10″ x 10′
one piece 2″ x 10″ x 18′
Rafters, spruce, 4 pieces 2″ x 10″ x 20′ for hips.
4 pieces 2″ x 10″ x 14′ for valleys.
33 pieces 2″ x 8″ x 14′ for jack.
24 pieces 2″ x 8″ x 10′ for jack.
Collar beams, 4 pieces 1″ x 6″ x 14′
Roof sheathing, 1″ x 4″ dressed one side, 2M hemlock.
Roof shingles, laid 5″ to weather, 20M.
Roof overhangs matched and beaded ceiling $\frac{7}{8}$″ x 4″ 1M.
Lookouts, 75 pieces as detailed.
Cornice moldings, a, b and c, 200′ of each.
Bed moldings, d and e, 170′ of each.

Barge boards, 4 pieces 5′-6″ as detailed.
2 pieces 7′-6″ as detailed.
2 pieces 9′-0″ as detailed.
2 pieces 9′-6″ as detailed.
2 pieces 16′-0″
Corner boards 4 pieces 9′
8 pieces 10′
12 pieces 14′
Base, wash and skirting, 150′ each.
Four brackets over entrances as detailed.
Cypress lap siding, 9″ face dressed one side, 2M.
Gal. Iron ridge roll, 28′ as shown.

Doors and windows complete for the following openings:

Doors.—

Two, 3′ x 7′-6″ x 2¼″ gl. tr. 22″, 4 lts.
Five, 3′ x 7′ x 1¾″ pan.
one, 3′ x 7′ x 1¾″ gl.
Three, 2′-2″ x 7′ x 1¾″ pan.
One 2′-10″ x 7′ x 1¾″ covered one side with tin.
Two bookcase doors gl.

Windows.—

Two double box frames 3′ x 5′ double run sash.
One plank frame single sash 3′ x 2′.
Six single box frames 3′ x 5′ double run sash.

One group of five windows box frames 4′-½″ x 8′-8″ double run sash. All above dimensions are inside the frames, and all as detailed.

Lathing and Plastering.—

500 yards.
1500′ of ¾″ grounds for same.

Blackboards.—

35′ of slate boards 4′ high, 145 square feet.

Inside finish to include.—

110′ picture molding.
110′ wainscoting cap with 35′ of chalk rail included.
90′ of burlap wainscoting 24″ high and 50′ backband.

Heating and Ventilation.—

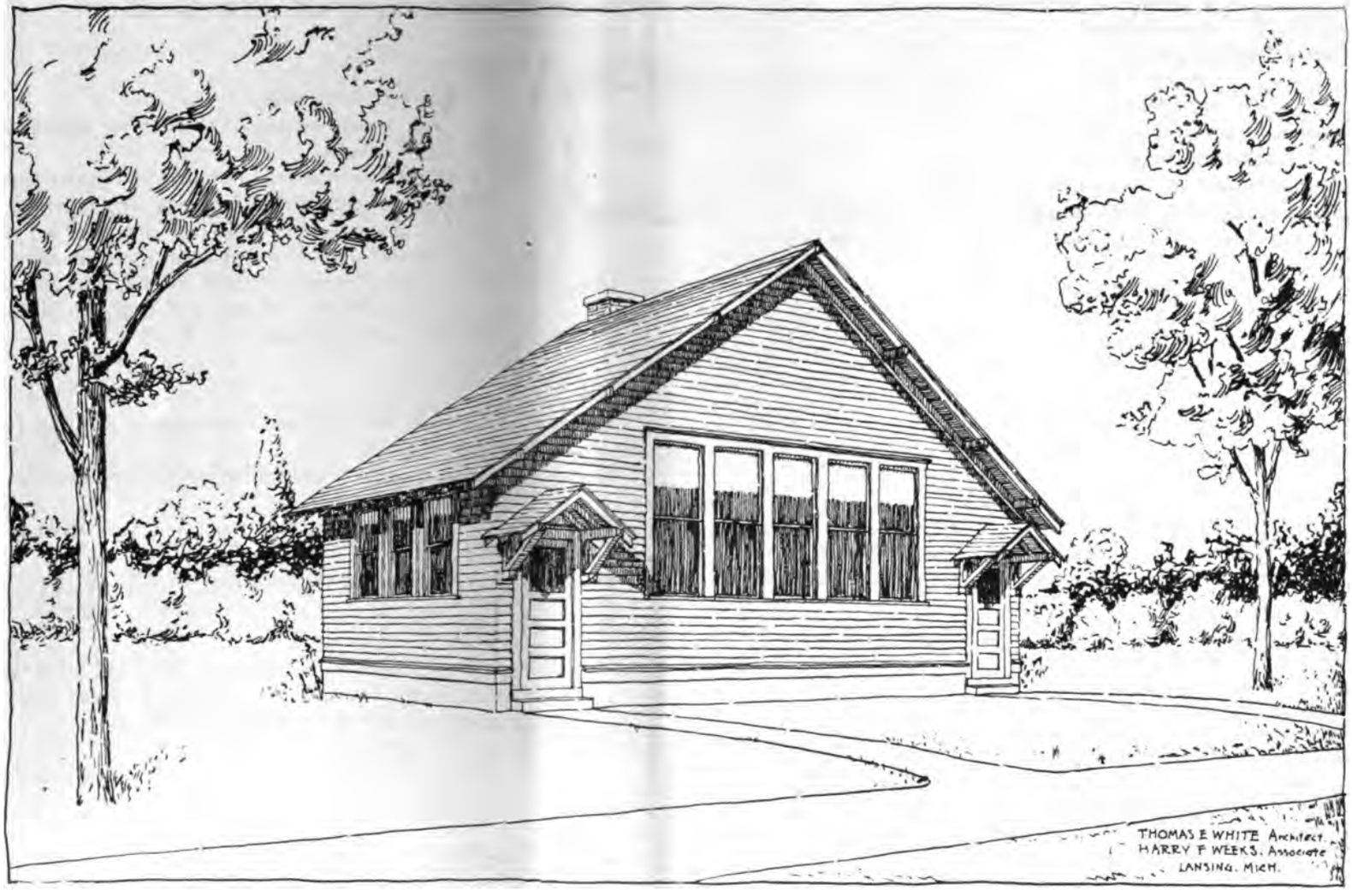
One heater complete with firing tools.
One 16″ x 46″ intake 4′ long connected to fresh air register and fitted with hinged cut-off.
One 41″ x 46″ x 44″ air box connected to intake and heater jacket.
One 16″ x 46″ vent duct connected to vent register and averaging 24″ in length and connected to air box and provided with three 15″ x 18″ cut-offs, and also connected to vent stack.
One compound air jacket circular in form 46″ diameter and connected to heat register 20″ x 36″ 4ns 8′-3″ high over all, with two interlocking cut-off dampers each 2′-10″ x 1′-6″.

Painting.—

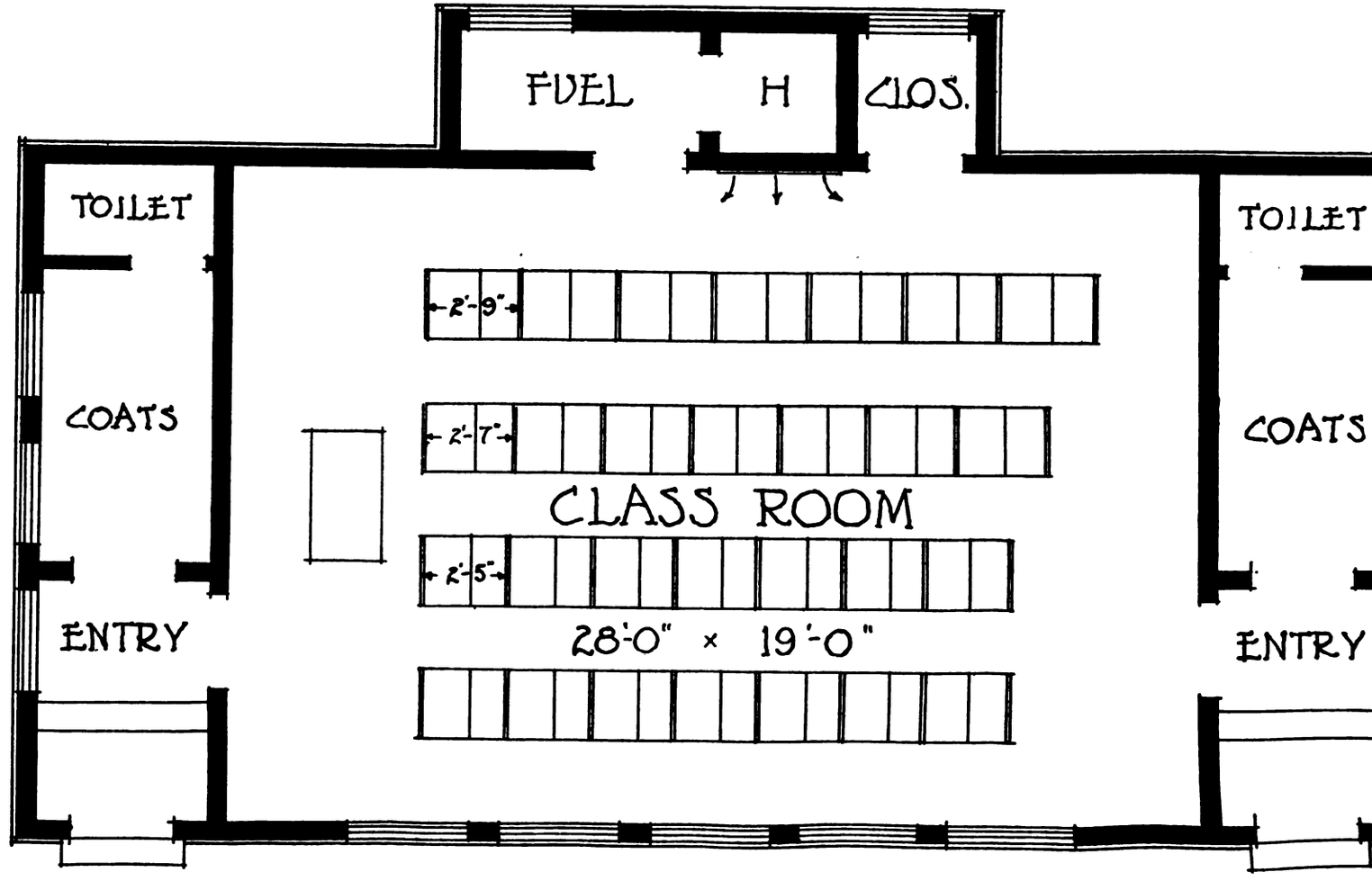
Acid stain for cypress lap siding and three coats of white lead and oil paint for all finish.
Wainscoting walls glue sized and burlap applied and over coated with lead and oil paint.
Plastered walls and ceilings in main room and work room to be finished with water color paint.
Inside wood work filled and varnished.

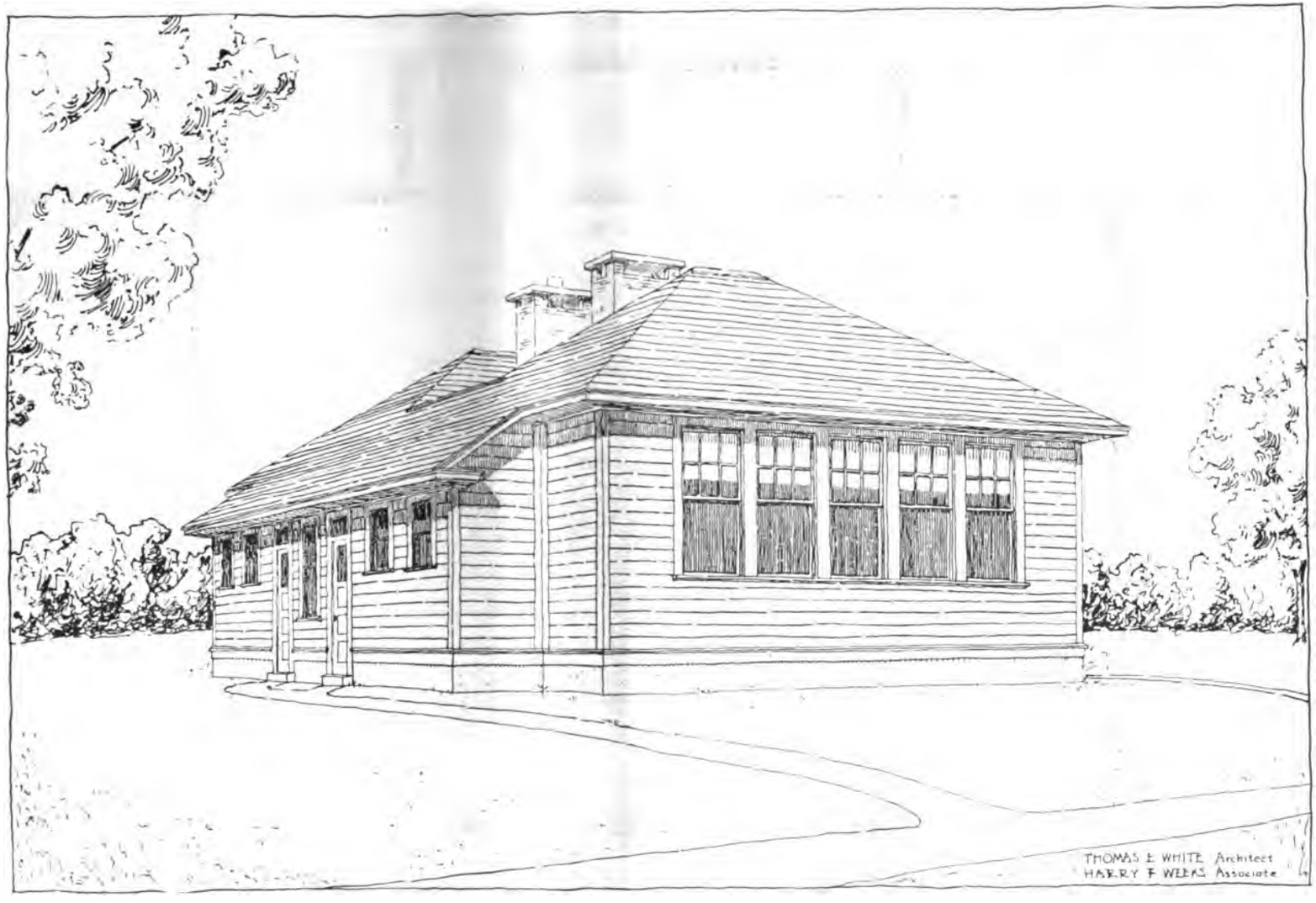
Hardware.—

Exit doors to be equipped with safety exit bolts and other doors with locks, knobs, butts, etc., complete. Windows weighted for all double run sash and to have lifts, locks, etc.

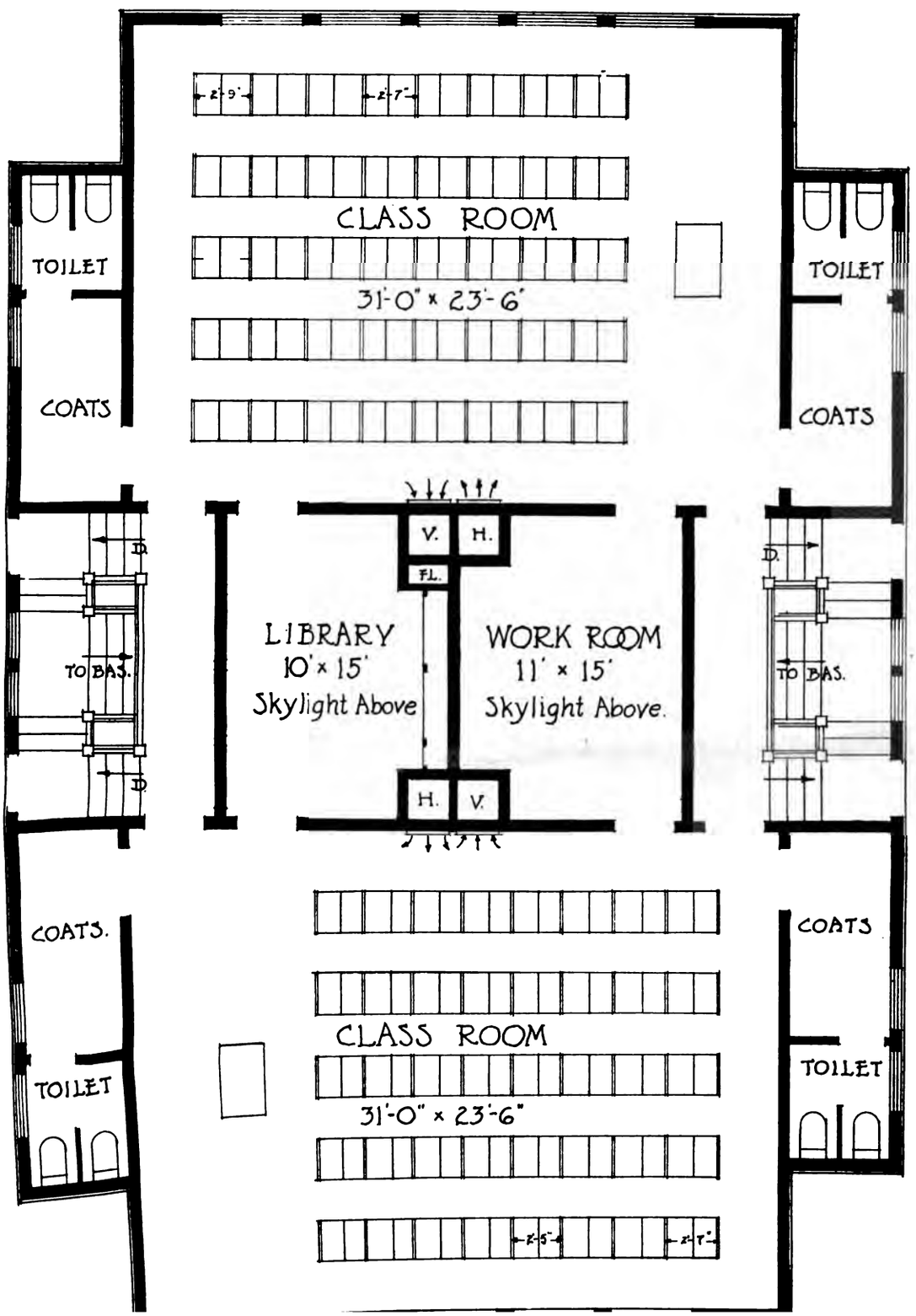


A CHEAPER BUILDING


FUEL
H
CLOS.
TOILET
TOILET
2'-9"
COATS
2'-7"
COATS
CLASS ROOM
2'-5"
ENTRY
28'-0" × 19'-0"
ENTRY



TWO-ROOM BUILDING


CLASS ROOM
31'-0" x 23'-6"
TOILET
TOILET
COATS
COATS
V.
H.
FL.
LIBRARY
10' x 15'
Skylight Above
WORK ROOM
11' x 15'
Skylight Above.
H.
V.
D.
TO BAS.
D.
D.
TO BAS.
COATS.
COATS
TOILET
TOILET
CLASS ROOM
31'-0" x 23'-6"

PLANS FOR A CHEAPER BUILDING

AND

A TWO-ROOM BUILDING

A Cheaper Building.—If a district has a small enrollment and cannot afford to erect the Michigan schoolhouse another floor plan may be used. This provides for a smaller amount of floor space yet retains many of the attractive features of the more expensive building such as the separate entrances, cloakrooms and toilets, the heating and fuel rooms. It does not include the work room which is a distinct loss as such a room would be a decided advantage in practically any schoolhouse. While its cost will exceed a building modeled on the frequently seen barn-like structures it must be remembered that it provides for the fuel and outhouses in the one building, is scientifically planned and is attractive in appearance from every direction.

Two-room Buildings.—As people are beginning more and more to appreciate the fact that no teacher can do justice to a large enrollment of children, the demand for two-room buildings is becoming more insistent. A floor plan of a most attractive two-room building is given here, the features of the Michigan schoolhouse being retained. If the one-room building plan is followed and later it becomes desirable to add another room, this can be done to advantage without great expense and without destroying the appearance of the building. A basement under part of the building will provide a place for the furnace or if no basement is built two heating rooms can be arranged with a fuel room between them.

PART IV

THE STANDARD SCHOOL

UNIV OF
CALIFORNIA

THE STANDARD SCHOOL

To arouse the spirit of improvement among the people as well as among school officers and teachers and to lay out a field of definite achievement, the Superintendent of Public Instruction provides the Standard School plan. A certain degree of excellence in environment, in comfortable and sanitary conditions, and in the ability and character of the teacher, is fixed upon as necessary for a proper efficiency of the school. Upon meeting the requirements, the State of Michigan will set a special mark of approval by awarding to the school a metal plate, bearing the words "Standard School" and by conferring upon this school a diploma certifying to the excellence of the school. The specifications of the Standard School will include yard and outbuildings, the schoolhouse, furnishings and supplies, the organization, and the school.

How Award is Made.—Schools wishing to be standardized should communicate with the County Commissioner. Upon the invitation of the Commissioner, some official from the Department of Public Instruction will visit the county and inspect the schools. This official will approve or will make recommendations for the changes that may be necessary in order that the school may meet the requirements. The setting of the plate and the conferring of the diploma may be made an event of much importance in the community. The Superintendent of Public Instruction or his representative will be present to set the plate and award the diploma.

Subject for Discussion.—It is earnestly recommended that the Standard School movement be a topic for discussion at farmers' institutes, grange meetings and school officers' meetings. There are communities where the people feel that their schools are good enough. It is expected that this movement and these discussions will awaken an interest in the people of such communities. One Standard School should result in several Standard Schools in the vicinity.

REQUIREMENTS FOR A STANDARD SCHOOL

YARD AND OUTBUILDINGS

1. Ample grounds of at least one-half acre.
2. Some trees and shrubs tastefully arranged.
3. Good approaches to the house.
4. Two well-kept, widely separated outhouses or sanitary indoor closets.
5. Suitable room or place for fuel.

SCHOOLHOUSE

1. House well built, in good repair and painted.
2. Good foundation.
3. Well lighted with some attention to proper lighting. Must be no windows which the children or teacher have to face.
4. Attractive interior decorations.
5. Good blackboards, some suitable for small children.
6. Heated with room heater and ventilator or basement furnace which brings clean air in through furnace and removes foul air from room.
7. Hardwood floor and interior clean and tidy.

FURNISHINGS AND SUPPLIES

1. Desks suitable for children of all ages, properly placed.
2. Good teacher's desk.
3. Good bookcases.
4. A good collection of juvenile books suitable as aids to school work as well as for general reading.
5. Set of maps, thermometer, globe, dictionary, sanitary drinking facilities.

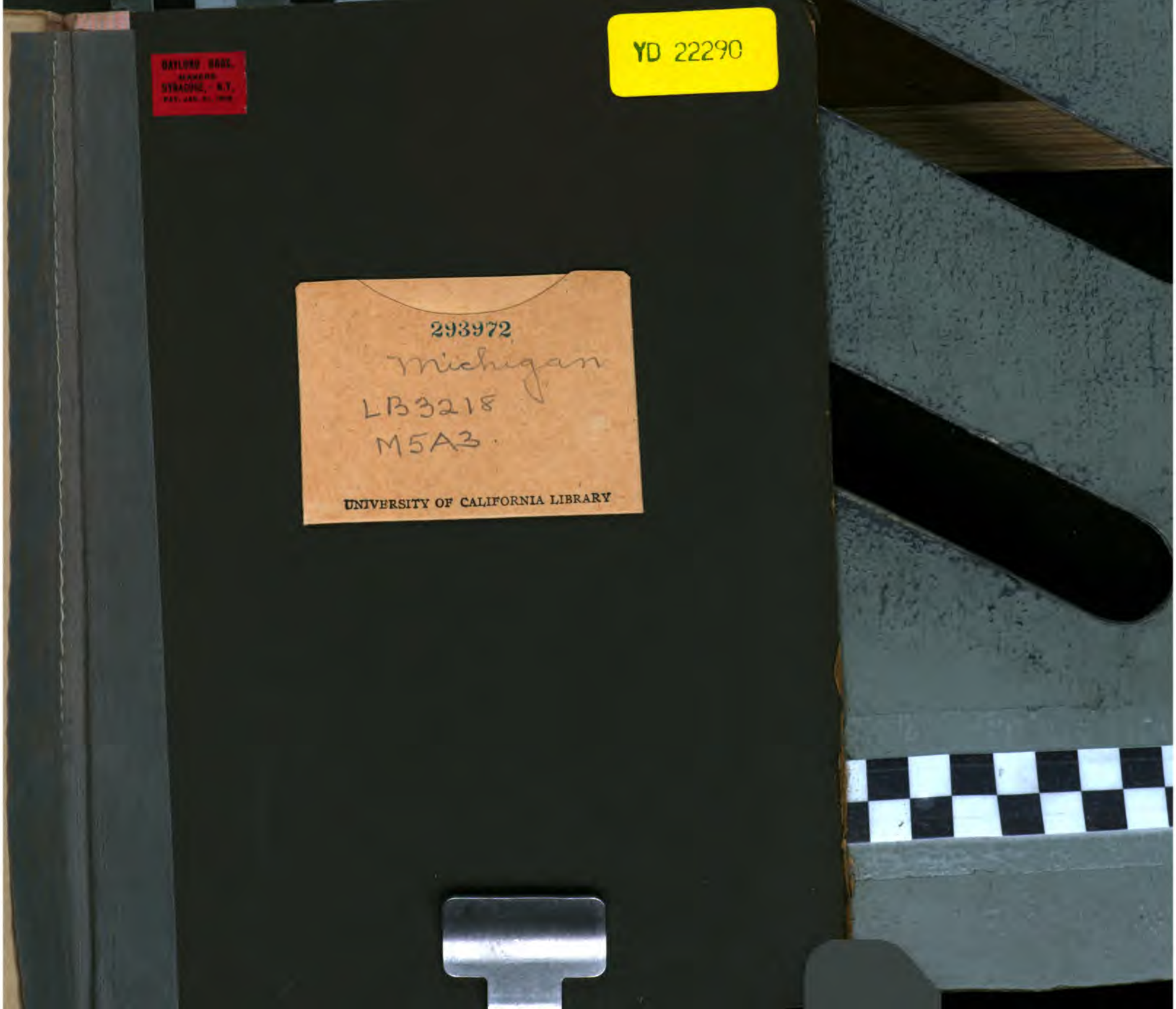
ORGANIZATION

1. School well organized, especially as to grades.
2. Classification and daily register well kept.
3. Definite program of recitation and study.
4. Regular attendance.
5. At least eight months of school.
6. Good discipline.

THE TEACHER

1. Education: The equivalent of a county normal course or of a four-year high school course.
2. Must receive a suitable salary.
3. Ranked by the County Commissioner as a good or superior teacher.
4. Must attend institutes and teachers' meetings.

The construction of the schoolhouse and of the outbuildings, the lighting, heating, ventilation, water supply, furniture and appurtenances are all discussed at length in other sections of this bulletin. For information concerning the planting of trees and shrubs, consult Bulletin No. 51. This bulletin is issued by the Department of Public Instruction and should be in the hands of every teacher and school officer in the State. For any further or any additional information, write to the Department of Public Instruction.


YD 22290

293972
Michigan
LB3218
M5A3

UNIVERSITY OF CALIFORNIA LIBRARY